Founded in 1832

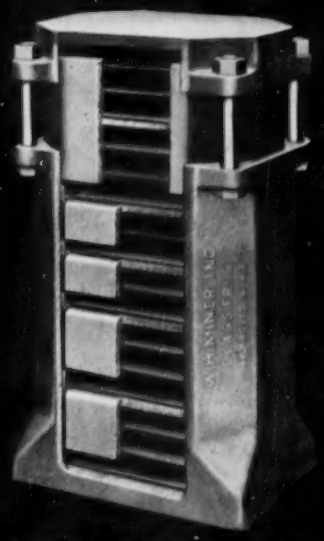
RAILWAY LOCOMOTIVES AND CARS

formerly Railway Mechanical and Electrical Engineer

NOVEMBER 1955

One of Five Specialized Railway Age Publications

MINER
F.R.-16
RUBBER DRAFT GEAR



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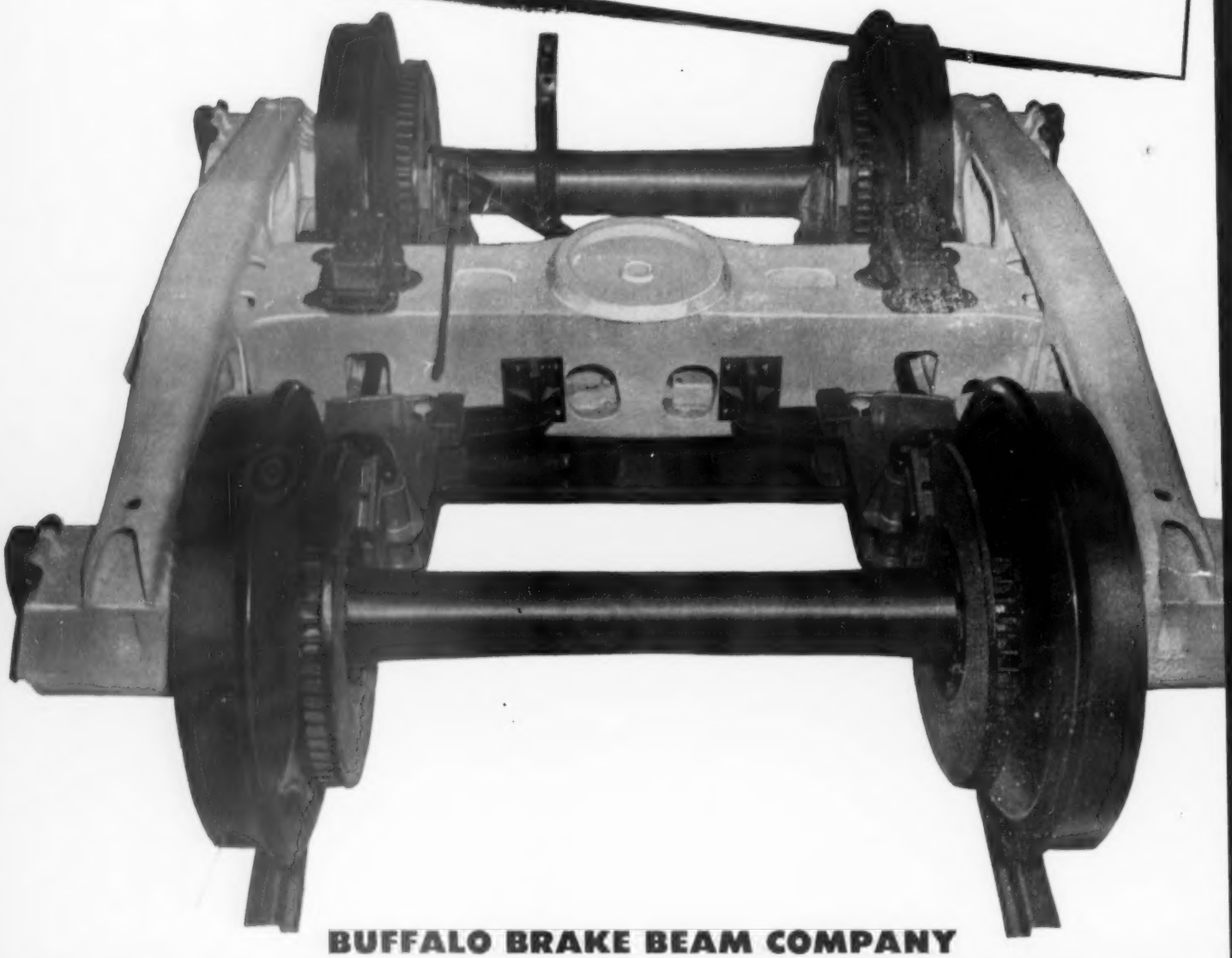

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SCIENCE

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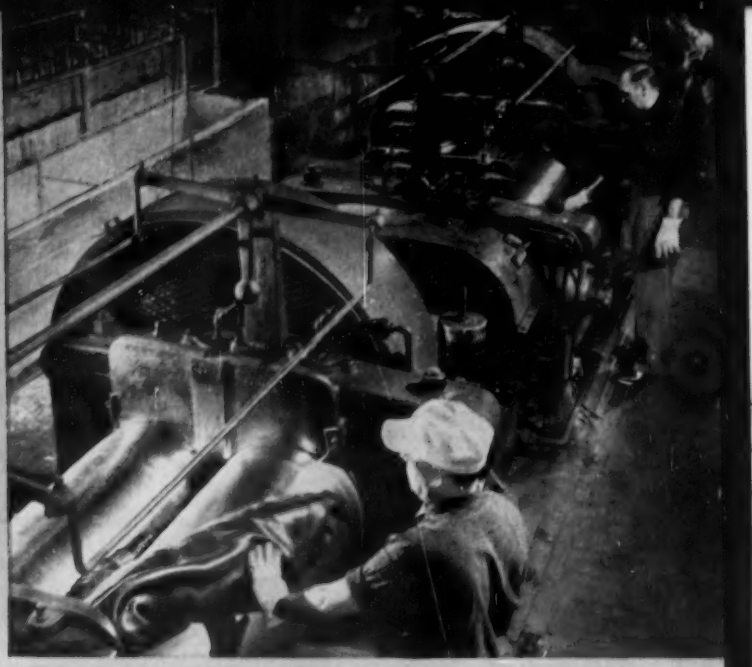
PERFORMANCE CHARACTERISTICS of thousands of WABCO compositions are on record in our research laboratory. Here, a WABCO sample is being processed on a special laboratory mill.



ON THESE PRODUCTION MILLS, the laboratory formulas are carefully duplicated to insure that you get the proper composition every time you order genuine WABCO parts.

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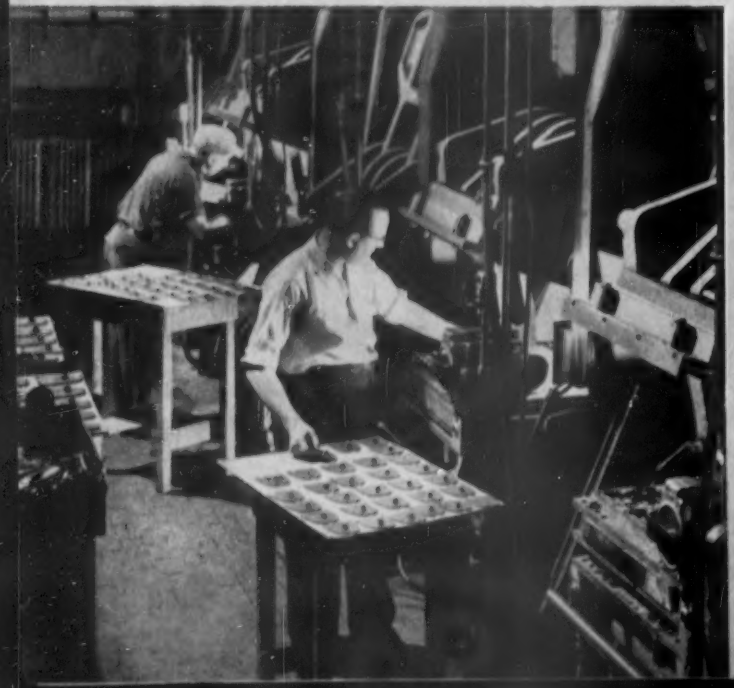

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

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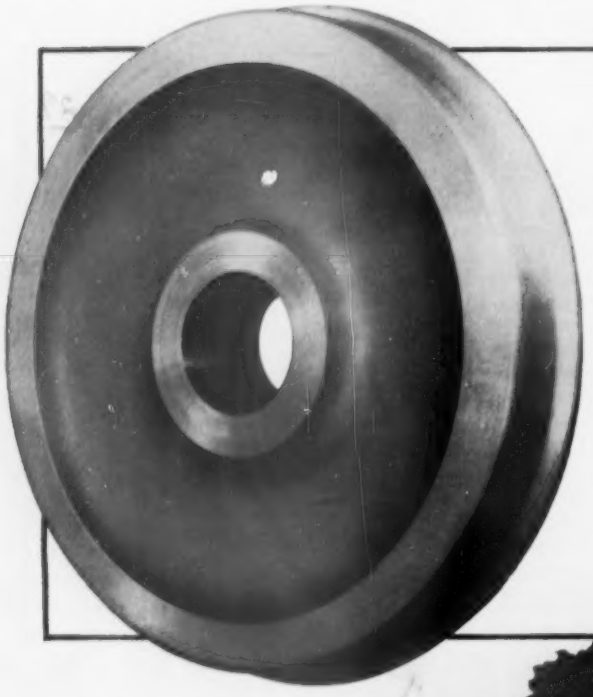

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for more mileage
under heavier loads
at higher speeds

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WROUGHT STEEL WHEELS

USS Multiple-Wear *Wrought* Steel Wheels deliver more ton miles per dollar than any other type wheel—for two reasons. Because they are made of steel, they possess the strength and toughness to bear heavy loads, the hardness to resist wear, and the ductility to minimize sudden brittle fractures. Secondly, this excellent combination of inherent properties is improved by forging, rolling, and control-cooling, resulting in a wheel of unequalled soundness. No other wheel is so well prepared for heavy loads, severe braking and high speed impacts. No other wheel requires so little maintenance, gives such long, dependable service at comparable cost.

USS Multiple-Wear *Wrought* Steel Wheels are produced for all types of railroad applications including Diesel locomotives, electric and steam locomotives, passenger, express, and heavy-duty freight cars.

Two strategically-located, complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

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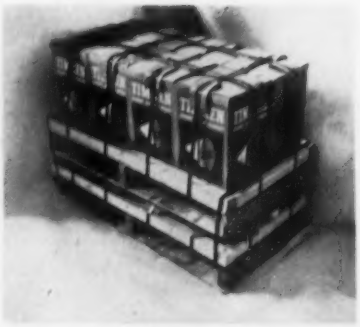
USS WROUGHT STEEL WHEELS

UNITED STATES STEEL

EQUIPMENT... *New Ideas—New Uses*

Bearing Packaging

The railroad bearing packaging system introduced by Timken assures a minimum of handling and a maximum of speed in supplying bearings. The complete pre-assembled, pre-adjusted and pre-lubricated railroad freight car bearing is packaged in a cardboard box. Eight such boxes, one car set, are placed on a single pallet. Eight



wedges or adapters also packaged in heavy-duty cardboard boxes are placed on another pallet. The palletized bearings are then placed on top of the palletized wedges or adapters and banded together. Freight cars are loaded so these pallets can be unloaded with a lift truck.

The bearings are unpacked from the cartons by removing two staples at the top of the package and lifting out the bolts and end cap. A rip cord around the bottom of the cardboard bearing package separates the end of the package from the middle package section. After the bearing is pressed into place, the remaining cardboard around the bearings falls away and the job is completed. *Timken Roller Bearing Company, 1835 Dueber avenue, SW, Canton, Ohio.*

Mobile Journal Jack and Brass Trimmer

A self-propelled combination jack and brass trimmer, the Yu-Brasser, has been designed to permit one man to raise car weight off the journal so that the wedge and brass can be removed for inspection. The brass can be trimmed on this truck, and then replaced over the same journal from which is was removed. It is claimed that this operation can be performed in two or three minutes, and that a full year's

test in one California yard showed inspection time cut in half. Because the brass worn to fit the journal is reused there, it is said that there were almost no hot boxes among the cars serviced.

The 2,600 lb truck is hydraulically driven with a two-cylinder, four-cycle air-cooled engine delivering 13 hp at 2,200 rpm. The engine drives a Vickers vane-type hydraulic pump operating at pressures up to 1,250 psi. To the right of his steering wheel the operator has a battery of four hydraulic control valves which control the following operations:

1. A hydraulic motor for driving the truck forward or backward through a chain drive.

2. A single-acting hydraulic ram mounted at the end of the arm forward of the body about 3 ft. This ram is the jack. It is swivel mounted, and is said to raise 15 tons a maximum of 6-in. in six seconds.

3. A double-acting hydraulic cylinder connected to the ram arm to raise or lower the arm and ram about 10-deg from the horizontal.

4. A hydromotor geared to a pivot shaft and connected finally to the ram arm to move it approximately 50-deg each side of center.

On the front hood of the Yu-Brasser is a hydraulic shaper for removing the babbitt burrs, It has a stroke of 15-in. and is equipped with a special vise for holding the car brass during trimming. Control for this tool is located adjacent to the shaper on the hood. Brakes are foot operated as is the throttle. There is also a hand control for engine speed. The Yu-Brasser is complete with electric starter, generator, battery, horn, spotlight for night service, and a rack for extra brasses. *Yuba Manufacturing Company, Benicia, Cal.*

(*Turn to page 90*)

Built by Baldwin in 1869, the "Springville" served freight routes of the Lehigh Valley until 1905. A 4-6-0 type, it had 54" drivers and a total weight of 80,304 lbs.

Then...and now...serviced with Esso Railroad Products

Valuable experience in research and development, along with continual testing on-the-road and in-the-lab, stand back of the outstanding performance of famous Esso Railroad Products.

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ESSO ANDOK Lubricants—versatile greases
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ESSO Weed Killer
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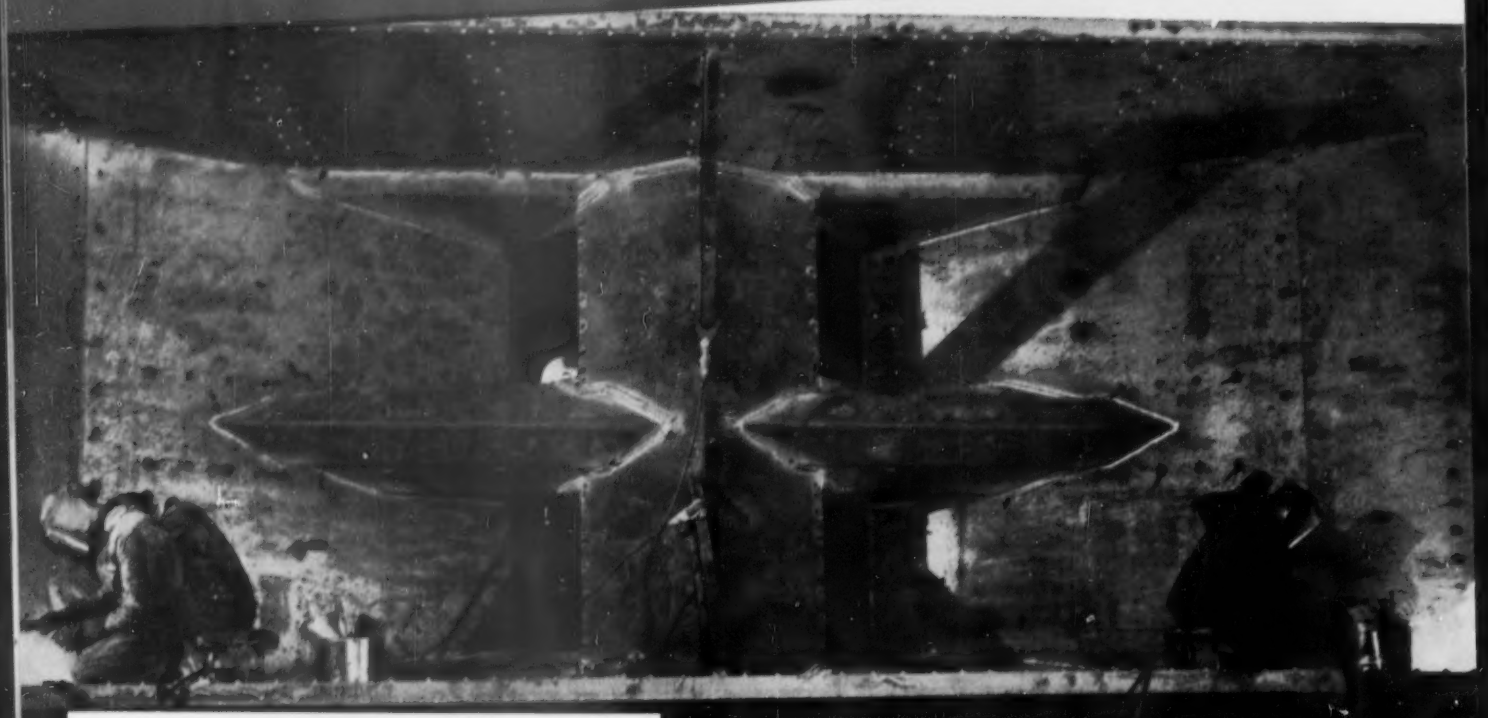
By reducing corrosion damage in hopper cars



NOW AVAILABLE . . . Our new "Design Manual for High Strength Steels" is ready for distribution. This excellent book contains comprehensive and practical information that you will find extremely useful in designing your product for greater economy and efficiency by the sound use of high strength steels.

• • •

For your free copy, write on your company letterhead giving your title or department, to United States Steel Corporation, Room 707, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

TO SAVE $570,500 IN MAINTENANCE COSTS USS COR-TEN Steel plates are used throughout in the 652 Virginian 55-ton hopper cars being rebuilt this year. The use of COR-TEN Steel—which has 50% higher yield point than copper steel and 2 to 3 times the resistance to atmospheric corrosion—means that no heavy repairs will be needed on these cars for 20 years. In contrast, copper steel construction would require at least one, and possibly two, heavy repairs during that time. Thus, by using USS COR-TEN Steel plates, at an added cost of only $275 per car, a clear savings in maintenance cost of $875 per car can be confidently expected.

In addition, since the cars built of USS COR-TEN Steel need be repaired only once in their lifetime as compared with two trips to the shops by copper steel cars, the revenue made available by having their cars in serviceable condition can be translated into profits for the Virginian.

COR-TEN Steel construction can pay off big

To reduce maintenance costs and increase service life...

Virginian Railway has made USS COR-TEN Steel a vital part of its car building and rehabilitation program

AFTER TAKING A HARD LOOK at the steadily rising cost of freight car maintenance, the Virginian Railway in 1947 launched a program designed to minimize such costs by using car construction that would increase time between shopping periods.

As a result, The Virginian in the past eight years has used USS COR-TEN Steel in 4872 open-top freight cars and, as part of a continuing program, is at present rebuilding 652 55-ton hopper cars in its own shops with this superior high strength steel.

This important coal carrier chose USS COR-TEN Steel because extensive tests and available records showed the service life of hopper car plates of USS COR-TEN Steel to be 50% to 100% greater than open hearth copper steel. So the Virginian figured that by using COR-TEN Steel in rather large quantities, they could also save money in rather large quantities, in spite of the slightly higher cost of COR-TEN Steel construction.

Here's how Mr. L. W. Doggett, Mechanical Engineer of the Virginian, puts it. "Our present practice when building new hopper cars or making heavy repairs for the first time to existing cars is to make all plates of USS COR-TEN Steel with the sides ½" thick, upper floor sheets and ends 7/16" thick, and all other plates, including door plates, ⅜" thick. With this construction, we feel that such cars can be kept in regular service twenty years or more before making heavy repairs, after which four years can be added by patching."

The attached table is worth your careful study. It shows how USS COR-TEN Steel construction pays off—at a ratio of more than 3 to 1—in reducing maintenance costs in Virginian Railway 55-ton hopper cars. It is on the basis of such demonstrated greater economy in service that USS COR-TEN Steel has been used in more than 46,000 hopper cars and 32,000 gondolas. Proved economic advantages are the reasons why more than 195,000 freight cars have been built better with USS COR-TEN Steel since 1933. Would you like us to figure how much you could save with such construction?

TYPICAL COST COMPARISON FOR 1000 55-TON HOPPER CARS USING USS COR-TEN STEEL OR COPPER STEEL BODY CONSTRUCTION

CONSTRUCTION COST of 1000 CARS	Cost of heavy repairs* after 12 years at $1150 per car	Cost of heavy repairs* after 20 years at $1425 per car	Cost of heavy repairs* after 24 years at $1150 per car	Total cost of heavy repairs
COPPER STEEL at $5,000 per car $5,000,000	$1,150,000	.....	$1,150,000	$2,300,000
USS COR-TEN Steel at $5,275 per car $5,275,000	.....	$1,425,000	.....	$1,425,000

Additional Cost of USS COR-TEN Steel....$275,000
Per car....$ 275

Total Repair Saving by USS COR-TEN Steel ..... $ 875,000

*All plates only

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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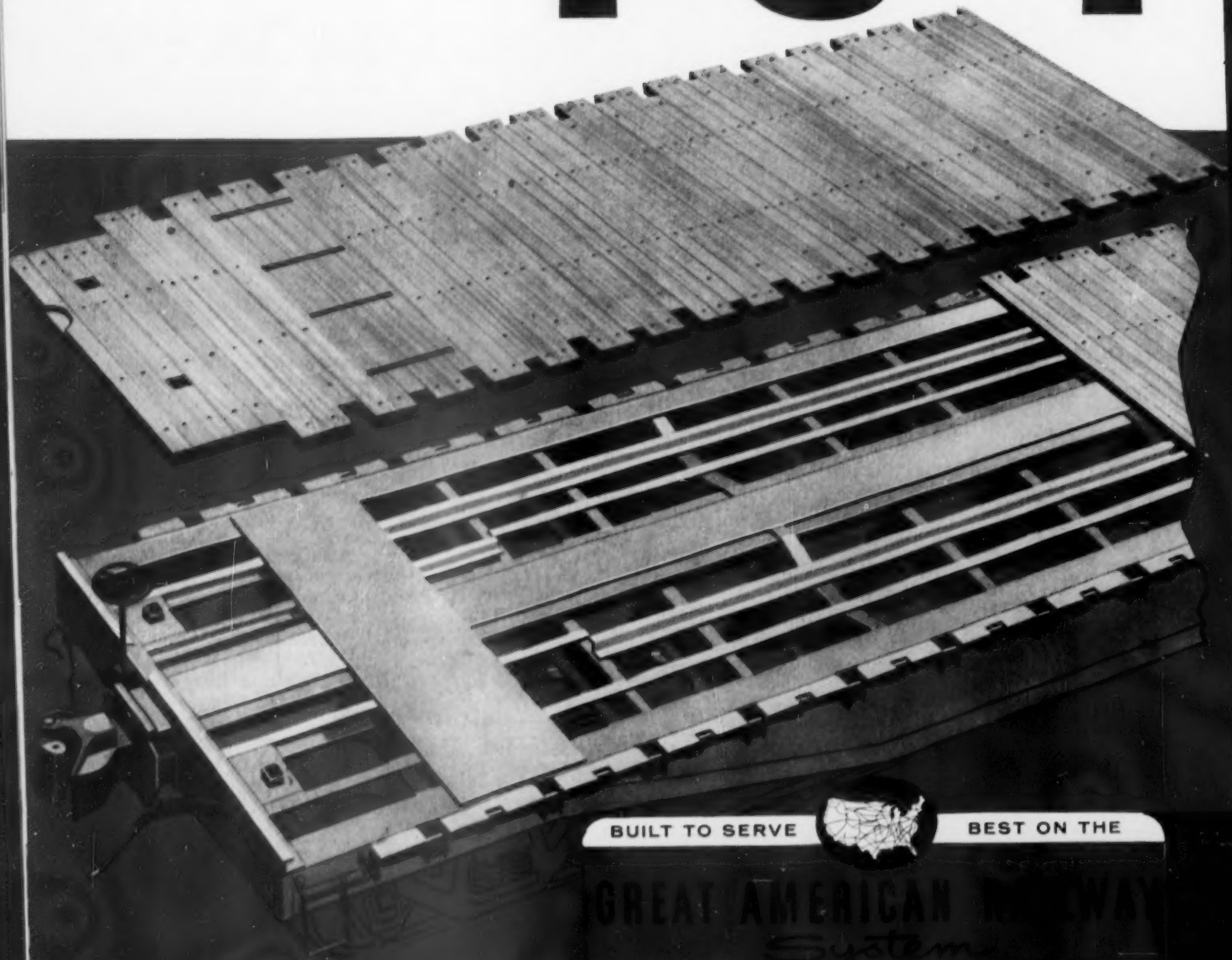
UNITED STATES STEEL

it's new! th PS-4



BUILT TO SERVE BEST ON THE

GREAT AMERICAN RAILWAY System

BY PULLMAN-STANDARD

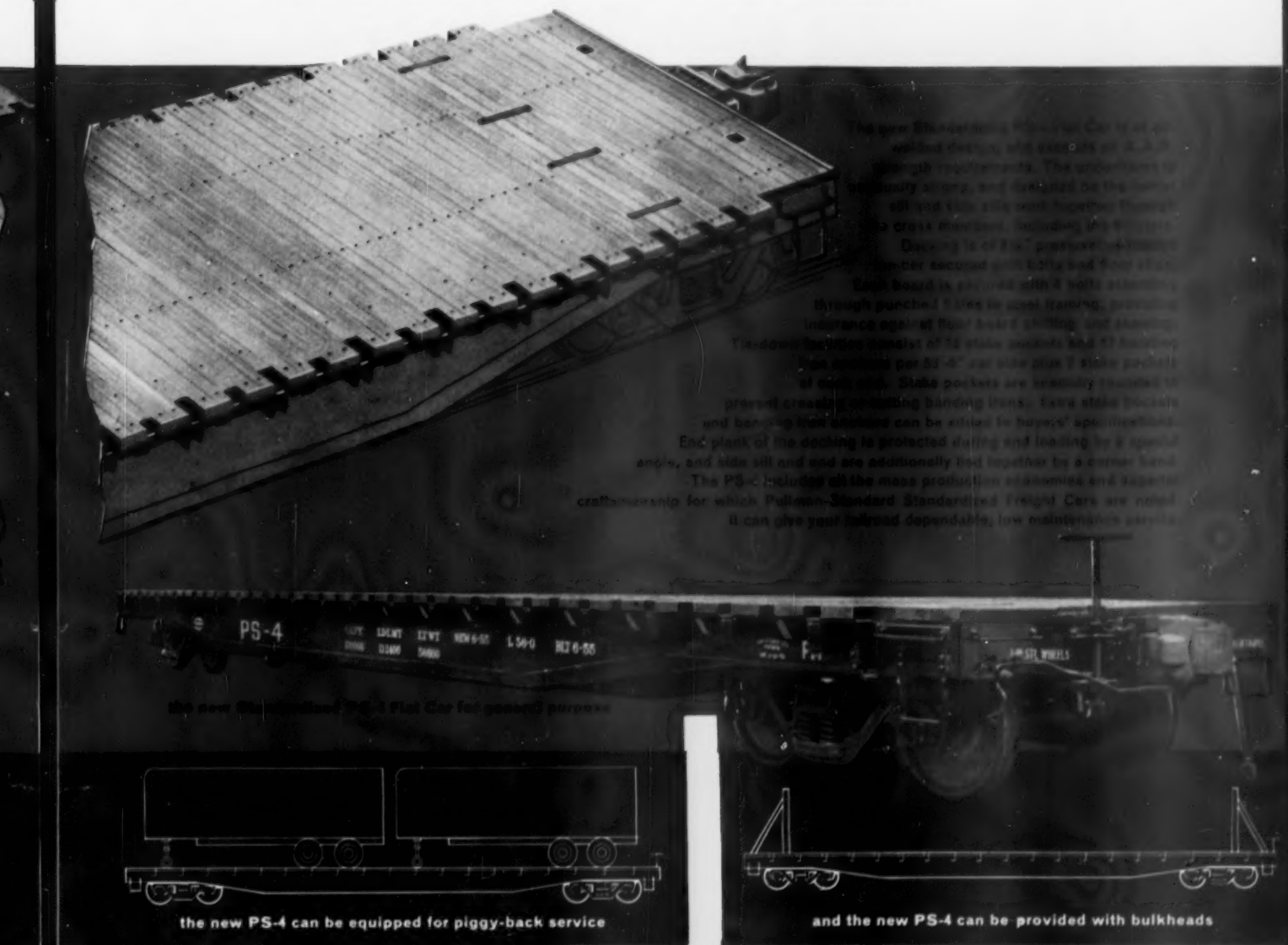
Write for your copy of Pullman-Standard's new PS-4 Flat Car brochure. It describes this new standardized freight car in detail. Your copy will be sent promptly.

standardized flat car

Pullman-Standard has designed and built a new flat car . . . the PS-4 . . . as the fourth unit in its line of Standardized Freight Cars. The new Standardized PS-4 Flat Car has been created to fill the special usages to which flat cars are traditionally put while exceeding in strength, versatility and dependability any preceding flat cars.

This new unit comes in lengths from 53′-6″ to 60′-0″, and in variations to 75′-0″ with both 50 and 70 ton capacities. In addition, its standardization is sufficiently flexible to allow Pullman-Standard engineers to work with PS-4 buyers for inclusion of bulkheads or piggy-back accessories if the car is to be used in special service.

Now added to the list of such famous standardized Pullman-Standard freight cars as the PS-1 Box Car, the PS-2 Covered Hopper Car, and the PS-3 Hopper Car, the PS-4 will provide rugged, dependable service with a minimum of maintenance wherever it is sent on the Great American Railway System.



the new PS-4 can be equipped for piggy-back service

and the new PS-4 can be provided with bulkheads

YOUR NEEDS CREATE THE PULLMAN-STANDARD

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

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- *Perfectly mated bearing halves*
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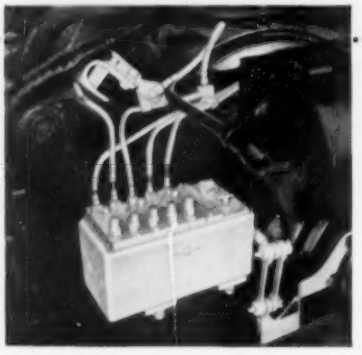
- *Available for all makes and types of diesel-electrics*

High Mileage

traction motor support bearings for LONGER ROAD LIFE

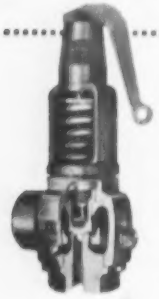
The extra precision that goes into Magnus traction motor support bearings pays off in longer, trouble-free mileage on the road. Quality control of metal mixes, high precision boring and final testing of mated bearing halves *under load* assure an extra margin of dependability — you can't buy a better bearing.

These Magnus HIGH-MILEAGE bearings are available for replacement on all types and makes of diesel-electric and electric locomotives and MU cars. For the complete facts, get your free copy of Bulletin No. 6000.



D-16 FLANGE LUBRICATOR increases mileage between wheel turnings up to 40%

This new, *more positive* method of flange lubrication not only gives greatly extended wheel life, but substantially reduces shop costs, too. Oil pressure to each flange is positively controlled by six individually adjustable pumps that are gang-operated from a common linkage to the truck frame. Unit operates only when locomotive is moving. Can be used to lubricate center pin wear plate also, if desired. Full 16-pint capacity for extra mileage between refills. Write for complete information.



MAGNUS 391 SAFETY VALVE

for dependable overload protection on diesel locomotive steam generators

This high-precision safety valve is specially made for railroad service on diesel locomotive steam generators. Opening and blowdown pressure adjustments are easily accessible and self-locking. Flexible metallic bellows prevent escape of steam into the generator compartment. Write for full details.

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PENNSALT CLEANER 35—Soaks away soils—from road grime to baked-on carbon. Dissolves readily in alkali or mineral laden water without scum or sediment.

PENNSALT CLEANER 45-X—An ideal soak cleaner that also is an excellent spray for running gear.

The toughest parts come clean *fast* in this Pennsalt Cleaner soak tank, located in the shops of a major Eastern railroad.

One of these Pennsalt Cleaners will meet 95% of all your shop needs for maintenance cleaning of steel parts

Why stock a dozen types of cleaners when one of these two general purpose Pennsalt Cleaners will give excellent results at lower cost? They meet almost all your shop cleaning needs on steel parts—*and give you important extra advantages.*

Both are powerful, free rinsing, fused alkaline silicates. They have the sustained heavy duty action needed for thorough soak cleaning of diesel locomotive parts. They will do your pre-inspection cleaning, clean your air and oil filters, your cylinder heads and liners—even strip paint. They have low sludging qualities . . . need only occasional recharging.

Your Pennsalt Railroad Maintenance Man will be glad to recommend the right cleaners to meet your needs. You'll be surprised how few are needed for many jobs—how the *right few* increases shop efficiency.

Give your man a call today. Or write: Railroad Maintenance, Pennsylvania Salt Mfg. Co., EAST: Three Penn Center Plaza, Philadelphia 2, Pa., WEST: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Favorite of the men in the shops

Pennsalt Chemicals

NEWS

ASME Diamond Jubilee Annual Meeting

Power Show, technical sessions, and inspection trips feature the Diamond Jubilee annual meeting of the American Society of Mechanical Engineers to be held this year in Chicago at the Congress, Conrad Hilton, and Sheraton-Blackstone Hotels from November 13-18. The Chicago Section of ASME will be hosts. A dinner and pageant highlighting ASME milestones from 1880 to the present have been arranged for Tuesday evening, November 15. The annual banquet will be held Thursday evening, November 17. Ceremonies will culminate with the initial presentation of the Elmer A. Sperry Award.

For the Railroad Division the following program has been arranged:

TUESDAY, NOVEMBER 15

Congress Hotel—Florentine Room

2 pm

RAILROAD I

Progress in Railroad Mechanical Engineering 1954 and 1955. (Report)

Adhesion—How Much? By F. G. Fisher, assistant mechanical engineer, Reading, and R. K. Allen, Locomotive and Car Equipment Laboratory, General Electric Company. Discussions by R. L. Wilson, vice-president, Brake Shoe and Castings Division, American Brake Shoe Company, and C. E. Tack, product engineering manager, American Steel Foundries.

Service Testing of Freight Cars, by O. A. Maier, director of research and development, Pullman-Standard Car Manufacturing Company.

WEDNESDAY, NOVEMBER 16

Conrad Hilton Hotel—Parlor B

9 am

RAILROAD II

Symposium on Lightweight, High-Speed Passenger Trains:

History and Development of the ACF Talgo, by J. R. Furrer, manager, Talgo Project, ACF Industries.

Practical Considerations in New Railway Passenger-Car Designs, by A. G. Dean, assistant chief engineer, Railway Division, Budd Company.

Pullman-Standard's New Lightweight Train—"Train X," by T. C. Gray, vice-president, engineering, Pullman-Standard Car Manufacturing Company.

The General Motors Lightweight Train, by B. B. Brownell, chief engineer, Electro-Motive Division, General Motors Corporation, and W. H. Harvey, co-ordinator of new products, Electro-Motive Division.

Remarks by C. K. Steins, mechanical engineer, Pennsylvania.

Shop Building Programs

Erie—The freight-car repair shop to replace the one destroyed by flood waters at Dunmore, Pa., will be in either Hornell, N.Y., or Meadville, Pa. The railroad has suitable property available at both places to build a new shop, which, it is estimated, will cost about $2,000,000. Detailed studies are being made of both locations.

ORDERS AND INQUIRIES FOR EQUIPMENT PLACED SINCE THE CLOSING OF THE OCTOBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	*No. of units*	*Horsepower*	*Service*	*Builder*
Atchison, Topeka & Santa Fe	32[1]	1,750	Road switching	Electro-Motive
	18[1]	1,200	Yard switching	Fairbanks, Morse
Minneapolis, St. Paul & Sault Ste Marie	5[2]	1,750	Road switching	Electro-Motive
New Orleans Public Belt	2	1,200	Switching	Baldwin-Lima-Hamilton
Pennsylvania	16[3]	1,600	Frt. and switching	Alco Products
	5[3]	2,400	Passenger	Alco Products

FREIGHT CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Atchison, Topeka & Santa Fe	500[4]	70-ton gondolas	Pullman-Standard
	500[4]	70-ton gondolas	General American
	300[4]	50-ton box	ACF Industries
	500[4]	50-ton box	Company shops
Bangor & Aroostook	180[5]	Pulpwood	Magor Car
Boston & Maine	1,000[6]	50-ton box	Pullman-Standard
Chesapeake & Ohio	500[7]	70-ton hopper	Company shops
Minneapolis, St. Paul & Sault Ste Marie	500[8]	Box	Company shops
Reading	150[9]	70-ton covered hopper	ACF Industries

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Canadian Pacific	1[10]	(RDC-1) Rail diesel	Budd
	1[10]	Rail diesel (RDC-3)	Budd
Chicago, Burlington & Quincy	4[11]	Siesta coaches	Budd
	5[11]	50-pass. coaches	Budd
	2[11]	Vista Dome coffee-shop-dormitory	Budd
	11[11]	Bedroom	Budd
	2[11]	Vista Dome parlor-observation	Budd
	2[11]	Vista Dome coaches	Budd
	2[11]	Dining	Budd
Missouri Pacific	6[11]	Sleeping	Budd

TRAIN ORDERS

Boston & Maine	See footnote 13	ACF Industries

[1] Deliveries expected to be completed by August 1956.
[2] The Wisconsin Central will receive two of the units in January; the Soo Line, 3 in April.
[3] Scheduled for delivery before January 1.
[4] These cars, plus 100 ore and 100 flat cars previously ordered from company shops and 50 air dump cars ordered from Magor Car, comprise the 2,050 cars the purchase of which had been authorized by the road's board of directors.
[5] Estimated cost, $1,500,000. Delivery expected in spring of 1956.
[6] Authorization to purchase these cars reported in the October issue, page 15.
[7] Estimated cost, $3,600,000. Deliveries expected to start next June.
[8] To be equipped with Nailable Steel flooring. Work to begin next spring.
[9] To cost over $1,300,000. Deliveries expected to begin in March.
[10] These cars are in addition to the three reported in the October issue, page 14.
[11] For completely reequipping "Denver Zephyrs." Each of the two trains, which are expected to enter service between Chicago and Colorado in the fall of 1956, will consist of 11 cars.
[12] Estimated unit cost, $260,000.
[13] Directors of the B&M have authorized the purchase of a Talgo train "of the latest type built by ACF Industries." It is expected the train will be delivered about mid-1956 for service between Boston and Portland, Me. A Talgo demonstration train recently made tests on the B&M.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
July, 1951	2,768,920	8,886	18,823	27,709	99,929
July, 1952	2,575,299	10,566	15,833	26,399	97,553
1953					
July	2,925,317	9,342	15,775	25,117	116,467
August	2,971,020	8,638	14,160	22,798	130,319
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,019	348,370
March	2,658,757	2,196	3,637	5,833	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,254	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,786
September	2,614,432	6,740	8,882	15,622	167,358
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,516	3,467	5,982	454,232
December	2,751,644	1,301	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,850,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813

Shop Programs

(Continued from Page 14)

New York Central—The NYC has consolidated its car-building and car-repair work for its lines East in the Despatch Shops, Inc., at Rochester, N. Y. The Central's car shops at Buffalo have been closed and their work transferred to Rochester. Despatch Shops, a wholly owned subsidiary of the road, is leasing its plant and facilities to the New York Central and is being operated as the road's East Rochester shops. No expansion of the East Rochester facility is planned now, but equipment that can be used there is being moved from Buffalo. The consolidation anticipates full scale operations at Rochester over a 12-month period, the road indicated. Economies are expected to be substantial.

St. Louis-San Francisco—Construction of a new car rebuilding shop at Springfield, Mo., has been authorized, at an estimated cost of $710,000.

Miscellaneous Publications

"The Railroad Dynamometer Car of the University of Illinois and the Illinois Central Railroad." By Prof. John K. Tuthill (dec.). Bulletin contains a brief history of the development of this type of test equipment, and diagrams and illustrations of the present car used both for research and for training students. Though designed for use with steam locomotives, much information of value with any kind of power is given, and equipment could be installed to study diesel locomotives. Free. *Engineering Experiment Station, University of Illinois, Urbana, Ill.*

SELECTIVE MOTIVE POWER AND CAR PERFORMANCE STATISTICS

Freight Service (Data from I.C.C. M-211 and M-240)

Item No.		Month of July 1955	Month of July 1954	7 months ended with July 1955	7 months ended with July 1954
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	5,739	5,998	36,389	44,213
3-06	Total, Diesel-electric	35,998	33,003	243,489	223,516
3-07	Total, electric	747	630	5,103	4,501
3-04	Total, locomotive-miles	42,720	39,826	286,464	273,016
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,681	1,481	11,383	10,350
4-06	Empty, total	927	912	6,327	6,130
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	13,195	12,132	84,040	87,036
6-02	Total in oil-burning steam locomotive trains	2,850	2,378	12,866	15,436
6-03	Total in Diesel-electric locomotive trains	101,015	89,976	686,346	615,572
6-04	Total in electric locomotive trains	2,265	1,891	15,636	13,824
6-06	Total in all trains	120,082	106,988	803,859	734,575
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.02	1.02	1.02
10-02	Loaded freight car-miles	42.3	39.8	42.6	40.6
10-03	Empty freight car-miles	23.4	24.5	23.7	24.0
10-04	Total freight car-miles (excluding caboose)	65.7	64.3	66.3	64.6
10-05	Gross ton-miles (excluding locomotives and tender)	3,028	2,875	3,011	2,881
10-06	Net ton-miles	1,373	1,257	1,355	1,268
12	Net ton-miles per loaded car-mile (M-211)	32.4	31.6	31.8	31.2
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.4	61.9	64.3	62.8
14	Averages per train hour (M-211):				
14-01	Train miles	18.6	18.8	18.6	18.8
14-02	Gross ton-miles (excluding locomotive and tender)	55,522	53,354	56,000	53,739
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	46.6	42.0	46.2	42.1
14-02	All	44.2	39.5	43.5	39.8
15	Average net ton-miles per freight car-day (M-240)	922	772	889	781
17	Per cent of home cars of total freight cars on the line (M-240)	42.9	53.0	47.6	54.0

Passenger Service (Data from I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	1,513	2,315	9,942	16,909
3-06	Diesel-electric	21,975	21,662	142,074	145,828
3-07	Electric	1,307	1,407	9,223	9,794
3-04	Total	23,896	25,385	161,246	172,531
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	251,157	257,171	1,642,824	1,726,606
4-09	Total in coal-burning steam locomotive trains	8,434	10,399	56,289	83,213
4-10	Total in oil-burning steam locomotive trains	5,357	10,521	29,200	61,600
4-11	Total in Diesel-electric locomotive trains	222,650	221,122	1,451,643	1,473,153
12	Total car-miles per train-miles	10.11	9.77	9.80	9.64

Yard Service (Data from I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning	294,118	296,166	1,893,856	2,219,777
1-02	Steam-oil-burning	53,548	54,939	322,025	378,366
1-03	Diesel-electric[1]	3,651,190	3,293,693	24,560,574	22,804,695
1-06	Total	4,005,102	3,652,422	26,822,324	25,467,880
2	Passenger yard switching hours:				
2-01	Steam, coal-burning	7,339	11,201	61,645	88,008
2-02	Steam, oil-burning	4,135	5,680	34,369	32,269
2-03	Diesel-electric[1]	249,661	258,571	1,708,602	1,786,399
2-06	Total	287,210	300,515	1,984,208	2,091,109
3	Hours per yard locomotive-day:				
3-01	Steam	5.9	4.7	5.3	4.8
3-02	Diesel-electric	15.5	14.7	15.4	15.0
3-05	Serviceable	15.1	14.2	15.1	14.3
3-06	All locomotives (serviceable, unserviceable and stored)	13.6	12.2	13.3	12.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.65	1.72	1.63	1.71
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	71	72	75	75

[1]Excludes B and trailing A units.

PERSONAL MENTION

Atlantic Coast Line

D. B. Lacy, assistant superintendent motive power, Southern division at Waycross, Ga., appointed superintendent motive power of the division.

Canadian Pacific

Gregor Grant, district master mechanic at Calgary, Alta., retired.

R. C. Thom, division master mechanic at Winnipeg, Man., appointed district master mechanic at Calgary, Alta.

B. B. Woodland, general inspector of diesel equipment at Winnipeg, appointed division master mechanic at Winnipeg.

S. A. Jones appointed general inspector of diesel equipment at Winnipeg.

D. F. Shaw appointed district diesel inspector at Calgary, Alta.

Chesapeake & Ohio

Appointed car lubrication inspectors: C. C. Doane at Grand Rapids, Mich.; Richard Gardull at Saginaw, Mich.; A. M. Childers at Huntington, W. Va.; F. J. Lyle at Richmond, Va.

Chicago, Rock Island & Pacific

L. C. Bowes, electrical engineer at Chicago, has retired.

Robert F. Newton appointed electrical engineer at Chicago. Formerly assistant superintendent, electric operations, Great Northern.

Erie

Michael J. Fedorka, general foreman and wreckmaster at Susquehanna, Pa., appointed division car foreman at Jersey City, N. J.

Maine Central

Roy E. Baker, general manager—mechanical at Portland, Me., appointed general manager.

Missouri Pacific

G. W. Niemeyer, road master mechanic, appointed acting terminal master mechanic. Headquarters, North Little Rock, Ark.

H. E. Jamison appointed acting road master mechanic. Headquarters, North Little Rock, Ark.

New York Central

F. L. Hoffman appointed master mechanic at Harmon, N. Y.

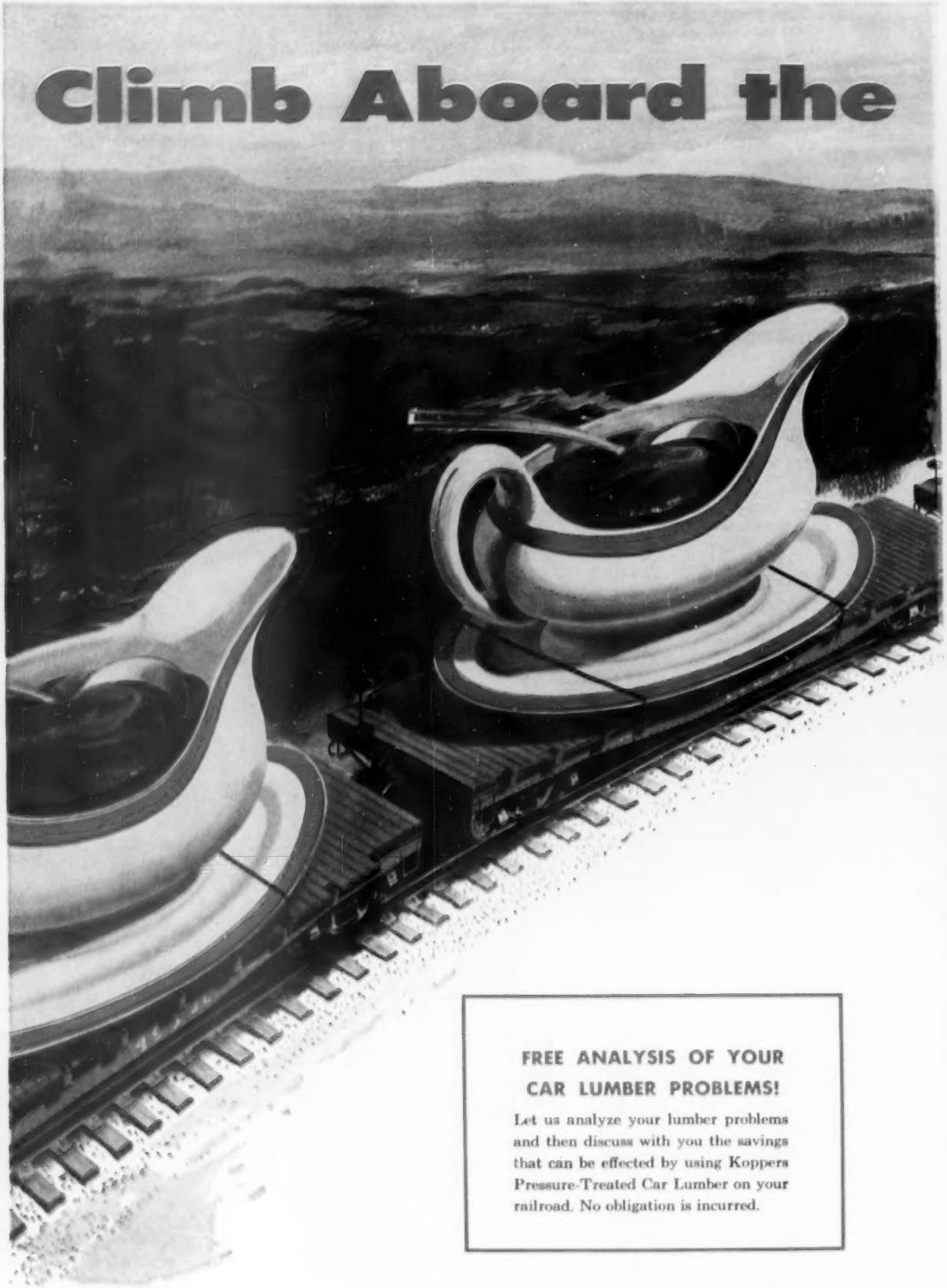
R. J. Parsons appointed assistant master mechanic at East Syracuse, N. Y.

Norfolk & Western

H. G. Gillespie, Jr., appointed mechanical inspector, office of general superintendent motive power.

Howard L. Davis, gang leader at Williamson shop, appointed gang foreman.

(Continued on page 18)



FREE ANALYSIS OF YOUR CAR LUMBER PROBLEMS!

Let us analyze your lumber problems and then discuss with you the savings that can be effected by using Koppers Pressure-Treated Car Lumber on your railroad. No obligation is incurred.

Get a 10-year free ride with

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What happens when two new flatcars start out in life together—one with *untreated* wood members, and the other with *pressure-treated* wood members?

In five years, according to railroad records, the untreated car will usually be sidetracked for costly repairs to the lumber.

On the other hand, the car using *treated* lumber will just be "getting warmed up" when it reaches the same five-year mark. Seventeen months later, it will be at the break-even point. In other words, these extra months of service will have paid for the somewhat higher original cost of the pressure-treated lumber.

From then on it's all gravy!

From then on—in fact for the next ten years or more*—you get a "free ride" in respect to maintenance costs and out-of-service losses caused by decay damage. These revenue-cutting items are *eliminated* by constructing or repairing cars with Koppers Pressure-Treated Lumber.

**Seventeen years is the average service life for Pressure-Treated Car Lumber.*

KOPPERS COMPANY, INC.

Wood Preserving Division, Pittsburgh 19, Pennsylvania

KOPPERS **PRESSURE-TREATED CAR LUMBER**

PERSONAL MENTION *(Continued from page 15)*

Pennsylvania Reorganization

The Pennsylvania's former three regions and 18 divisions, as of November 1, have been replaced by nine newly constituted regions.

Each regional manager is responsible for production and sales and promotion of transportation, as well as industrial development in the area served. They will report to a system vice-president on matters affecting other regions, or the railroad as a whole. Under this vice-president is a vice-president in charge of transportation and maintenance, with system-wide responsibility.

On the president's staff is a vice-president in charge of freight traffic; another in charge of passenger traffic; a third in charge of research and development, and a fourth in charge of personnel.

Formerly the general superintendent of transportation, general superintendent of motive power and chief engineer-maintenance of way on the regions worked *through* division superintendents to trainmasters, master mechanics, and division engineers. The new officers are in direct charge of field operations. Trainmasters, road foremen of engines, master mechanics and district engineers located at various points on each region comprise their forces.

The organization of the general manager-transportation, set up on the new basis in June, has the basic goal of centralizing system control over equipment allocation and train movement. He is also a member of the system car committee charged with development of equipment needs and design.

A new officer and new top department is a vice-president-research and development. He will handle long-term research, such as the effect of atomic energy, growth and decline of territories, competitive developments and public aids and burdens. He will also coordinate studies and tests by other departments of new physical developments, like lightweight trains, trailers-on-flats, electrification and yard layout.

Following are the names and titles of officers and others as they relate to mechanical and electrical functions:

SYSTEM OFFICERS

Reporting to System Vice-president J. P. Newell, Philadelphia:

Vice-president transportation and maintenance: A. J. Greenough
Assistant vice-president—chief mechanical officer: H. T. Cover
Assistant chief mechanical officer: W. O. Teufel
Assistant chief mechanical officer—car: H. M. Wood
Manager—heavy repair shops: C. I. Clugh
Mechanical engineer: H. L. Decker
Electrical engineer: J. Stair, Jr.
Engineer—tests (Altoona): M. A. Pinney
Manager—methods and cost control—J. L. Parker
Supervisor—equipment expenditures: C. H. Bowers
Superintendent—floating equipment: J. N. Abbott
Supervisor—MCB clearing house: T. J. Boring

NEW YORK REGION

Reporting to Regional Manager P. M. Roper, New York:

Assistant regional manager: N. L. Fleckenstine
Superintendent—equipment: G. S. Webb
Supervisor—car equipment: A. P. G. Schlegal
Supervisor—methods and cost control: W. P. Bickley
Master mechanic (Newark): R. M. Holcombe
Master mechanic (New York): R. C. Johnston

PHILADELPHIA REGION

Reporting to Regional Manager G. C. Vaughan, Philadelphia:

Assistant regional manager: H. D. Kruggel
Superintendent—equipment: H. H. Haupt
Supervisor—car equipment: P. B. Cole
Supervisor—methods and cost control: C. R. Johnson
Supervisor—diesel equipment: T. L. Preun
Master mechanic (Harrisburg): L. A. Dixon
Master mechanic (Philadelphia): J. C. White

CHESAPEAKE REGION

Reporting to Regional Manager J. A. Schwab, Baltimore:

Assistant regional manager: V. H. McLean
Superintendent—equipment: J. S. Bell
Supervisor—car equipment: C. W. Garmon
Supervisor—methods and cost control: C. S. Kifer
Supervisor—diesel equipment: D. R. Knoff
Master mechanic (Wilmington): T. J. Sheridan
Master mechanic (Baltimore): R. E. Pinkham

NORTHERN REGION

Reporting to Regional Manager P. W. Neff, Buffalo:

Superintendent—transportation: E. P. Adams
Superintendent—equipment: E. C. Hanly
Supervisor—car equipment: J. K. Sherwood
Supervisor—methods and cost control: N. L. Butters
Supervisor—diesel equipment: M. J. Mitchell
Master mechanic (Williamsport): C. A. Korn, Jr.
Master mechanic (Buffalo): P. E. Geise

PITTSBURGH REGION

Reporting to Vice-president and Regional Manager M. S. Smith, Pittsburgh:

Assistant regional manager: H. H. Vaughn
Superintendent—equipment: H. C. Wright
Supervisor—car equipment: W. B. Moir
Supervisor—methods and cost control: R. J. Conrad
Supervisor—diesel equipment: F. C. Conte
Master mechanic (Pittsburgh): D. B. Owens
Master mechanic (Pitcairn): W. H. Yarber
Master mechanic (East Altoona): S. W. Shirley, Jr

LAKE REGION

Reporting to Regional Manager H. M. Phillips, Cleveland:

Assistant regional manager: E. L. Hofmann
Superintendent—equipment: W. J. Fulton
Supervisor—car equipment: J. A. Brimner
Supervisor—methods and cost Control: E. Windisch
Supervisor—diesel equipment: K. E. Burns
Master mechanic (Cleveland): W. H. Long
Master mechanic (Canton): D. M. Peck

BUCKEYE REGION

Reporting to Regional Manager A. M. Harris, Cincinnati:

Superintendent—equipment: J. P. Francis
Supervisor—car equipment: J. M. McGuigan
Supervisor—methods and cost control: G. L. Winnegar
Supervisor—diesel equipment: B. L. Hartley
Master mechanic (Cincinnati): P. I. Harclerode
Master mechanic (Columbus): H. S. Miller

SOUTHWESTERN REGION

Reporting to Regional Manager C. G. Magruder, Indianapolis:

Superintendent—equipment: R. R. McKinney
Assistant superintendent—equipment J. M. Carpenter
Supervisor—car equipment: H. T. Bramblett
Supervisor—diesel equipment: W. S. Adams

NORTHWESTERN REGION

Reporting to Vice-president and Regional Manager H. H. Pevler, Chicago:

Assistant regional manager: J. D. Fuchs
Superintendent—equipment: C. W. Whistler
Supervisor—car equipment: S: Nagy
Supervisor—methods and cost control: P Thomas
Supervisor—diesel equipment: O. F. Opatz
Master mechanic (Chicago): P. G. Jamison
Master mechanic (Fort Wayne): L. E. J. Garrett

SUPPLY TRADE NOTES . . . . . .

AMERICAN BRAKE SHOE COMPANY. BRAKE SHOE AND CASTINGS DIVISION.—*Joseph H. Parsons*, vice-president, has retired. SOUTHERN WHEEL DIVISION.—"The First 5,000,000 Miles" is the title of a new sound/color motion picture describing the company's new "heavy duty" cast-steel wheel. The picture, produced for railroad audiences, tells the story of a multi-million dollar research program begun 14 years ago at the company's research center in Mahwah, N. J., and then shows the step-by-step manufacturing process used at the new Southern Wheel division plant at Calera, Ala. The plant has a capacity of 400 wheels a day.

■

INTERNATIONAL NICKEL COMPANY.—Headquarters of the central Atlantic coast technical field section of International Nickel development and research division

have been moved to 1150 York road, Abington, Pa., from 67 Wall street, New York.

■

TORMAN COMPANY.—The Torman Company, Chicago, has announced appointment of *Glenn Sudderth & Assoc.*, 423 Collier Road N.W., Atlanta, Ga. as southeastern representative for sale of Torman electrical equipment for diesel locomotives.

■

S. J. Fraenkel

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY—*Stephen J. Fraenkel*, has been appointed research and development director. He was formerly manager of the propulsion and structural research department of Armour Research Foundation.

■

W. C. Taylor

AMERICAN STEEL FOUNDRIES—*William C. Taylor*, district sales manager at Chicago, has been appointed vice-president, sales, transportation equipment division, in charge of the New York office. He succeeds *Edward M. Van Winkle*, resigned.

■

MAGNUS METAL DIVISION, NATIONAL LEAD COMPANY.—*John P. Borda* has been appointed general manager at New York, succeeding *William V. Burley*, who has retired.

■

MAGNUS METAL CORPORATION.—*Edward M. Van Winkle* has been appointed president, with headquarters at New York, succeeding *William V. Burley*, retired.

WESTINGHOUSE AIR BRAKE COMPANY.—*C. F. Hammer* has been appointed assistant director of engineering, Air Brake Division, at Wilmerding, Pa.

■

TIMKEN ROLLER BEARING COMPANY.—*Ralph W. Updegraff*, chief industrial engineer, Bearing Division, has been appointed chief industrial engineer of the company. *E. H. Hughes*, manager of the sales order department of the company, has been named to the newly created post of assistant to the sales director.

■

NATIONAL CARBON COMPANY, DIVISION OF UNION CARBIDE & CARBON CORP.—*Dr. Clarence E. Larson* has been appointed vice-president in charge of research. *Dr. L. M. Currie*, formerly vice-president in charge of research, continues as vice-president, assuming responsibilities involving sales, production, development and research.

■

GARLOCK PACKING COMPANY.—*Robert M. Waples*, executive vice-president, has been elected president, succeeding *Geo. L. Abbott*, who has been elected chairman of the board and chief executive officer.

■

MINNESOTA MINING & MANUFACTURING CO.—*Bertrand Y. Auger*

(Continued on page 87)

C-D-F TAPES of TEFLON*

- Heat Resistant—up to 500° F.
- High Dielectric Strength
- Strong, tough, durable

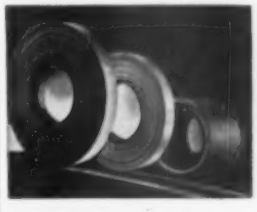
It is no longer necessary to spend time, effort and materials in frequent rewrapping of field coils. Use C-D-F TEFLON tapes for the job—they have unusually long service life. Tapes are easy to apply, easy to handle. Rolls are supplied in a wide range of widths and thicknesses either in 100% TEFLON film or TEFLON glass fabric supported.

TEFLON has high heat resistance—withstands 260° C. (or 500° F.) without appreciably affecting its physical or electrical properties. It meets Class H AIEE standards for maximum hot spot insulation temperature of 180° C. TEFLON has practically zero water absorption and its electrical properties are little affected after long exposure to high humidity. Its dissipation factor and dielectric constant are extremely low and unchanged over a wide range of frequencies.

TEFLON has a wide range of applications in the railroad industry. For wire and cable coverings where the electrical properties must not suffer impairment even under extreme temperature and humidity conditions, TEFLON is the ideal material. TEFLON may be applied in single or multiple wrapping operations which may include a TEFLON glass fabric cloth supported tape on the outside for resistance to abrasion. TEFLON wrapped cables find extensive use in Diesel locomotive wiring where abrasion of exposed wiring, due to undercar blast, is an important factor.

If you are not now using C-D-F TEFLON tapes and want to know more about TEFLON, the most promising of new plastics, write for Folder T-52 with samples. For technical assistance call your C-D-F sales engineer (offices in principal cities). He's a good man to know.

*du Pont Trade Mark



Continental-Diamond Fibre

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NEWARK 104, DELAWARE

Versatility . . . Light Weight . . . High Heat Conductivity!

PISTONS OF ALCOA ALUMINUM HAVE ALL THREE!

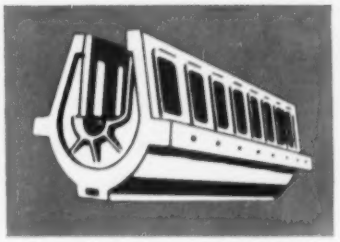
Only Alcoa produces all three types of pistons —permanent-mold, semipermanent-mold, and forged. Sizes of Alcoa® Pistons range from the smallest to 21" in diameter, and they may be ordered with or without inserts for added ring groove life.

Alcoa Aluminum Pistons weigh less—making possible increased engine speeds and resulting in increased horsepower.

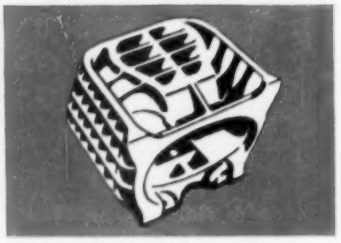
Aluminum's high heat conductivity lowers surface temperatures and allows greater engine output without increasing operating temperatures. To get the complete story on *all* Alcoa Aluminum products for the diesel industry, write: Aluminum Company of America, 1986-L Alcoa Building, Pittsburgh 19, Pa.

NEW TYPE OF PISTONS FOR FUTURE ENGINE DESIGNS

For diesel manufacturers who now have engines in the design stage, Alcoa's research and development teams have produced new types of aluminum pistons which embody many highly desirable features. While they are not yet in full production, Alcoa is ready to talk to manufacturers of high output engines—and to discuss the possibilities of *greater power from the same size engine!*

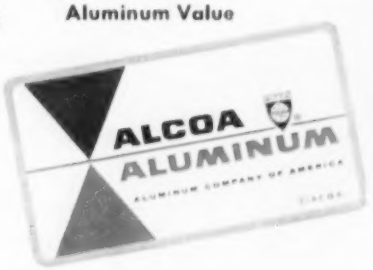


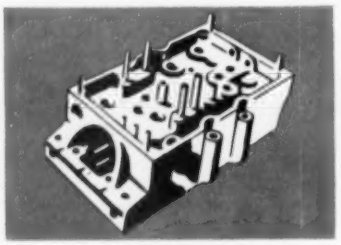
CRANKCASES AND FRAMES of lightweight Alcoa Aluminum give diesels higher horsepower-to-weight ratios, increase efficiency in operation.



SUPERCHARGING AND SCAVENGING are more efficient through the use of aluminum. Here, too, diesels can save weight through the use of aluminum.

Your Guide to Aluminum Value





CYLINDER HEADS of Alcoa Aluminum distribute heat better, allow increased engine ratings. They also mean lighter weight, easier servicing.

Electrician wiring motorman's cab control station on new M. U. car with Simplex Car Wire.

285 Multiple-Unit Cars Equipped with Simplex Car Wire

Simplex Car Wire is used to wire air-conditioning units, lights, and control equipment in 285 new, multiple-unit, passenger cars for several railroads.

The rubber insulation on Simplex Car Wire won't lose physical and electrical properties when soaked in water or exposed to heat.

A smooth, tough, neoprene jacket on Simplex Car Wire resists abrasion, acids and oil.

Simplex Car Wire strips readily for terminating. It's flexible and easy to handle.

It resists oxidation and withstands vibration.

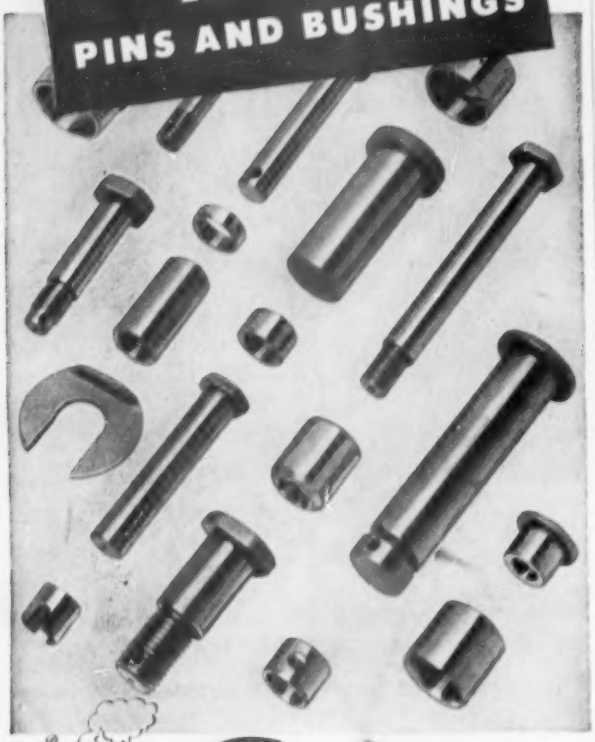
Write the Railroad Department at the address below for more details about Simplex Car Wire.

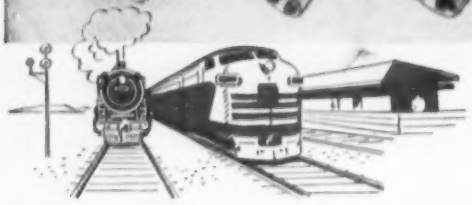
Simplex CAR WIRE

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

HARDENED and GROUND for LONGER wear

EX-CELL-O PINS AND BUSHINGS





Keep your equipment out of the shop and on the rails with Ex-Cell-O steel pins and bushings. They give from four to six times longer service than ordinary pins and bushings. The tough ductile core of Ex-Cell-O pins and bushings withstands shocks, vibration; their hard case and fine finish resist abrasive action.

52-23

Standard styles and sizes of Ex-Cell-O pins and bushings for steam, Diesel, and passenger car equipment are given in the new Ex-Cell-O Bulletin 32428. Write today for your copy.

RAILROAD DIVISION

EX-CELL-O CORPORATION

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STATEMENT required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of Railway Locomotives and Cars, published monthly at Philadelphia, Penna., for November, 1955.

1. The names and addresses of the publisher, eidtor, managing editor, and business managers are:

Publisher, Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7, N.Y.

Editor, H. C. Wilcox, 30 Church Street, New York 7, N.Y.

Western editor, G. J. Weihofen, 79 Monroe St., Chicago 3, Ill.

Business manager, C. W. Merriken, Jr., 30 Church Street, New York 7, N.Y.

2. The owners are: Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N.Y. Stockholders of one percent or more, James G. and Louise Lyne, 30 Church St., New York 7, N.Y.; Arthur J. McGinnis, 30 Church St., New York 7, N.Y.; Joseph S. and Clarice Crane, 30 Church St., New York 7, N.Y.; Frederick A. and Artimese B. Clark, 30 Church St., New York 7, N. Y.; Samuel O. and Carrie E. Dunn, 79 West Monroe St., Chicago 3, Ill.; Edward G. & Elizabeth Gavin, 79 West Monroe St., Chicago 3, Ill.; Joseph or Katherine Sanders, 2909 Maple Ave., Dallas 4, Texas; John R. Thompson and Kathe Thompson, 79 West Monroe St., Chicago 3, Ill.; Mae E. Howson, 6922 Paxton Ave., Chicago, Ill.; Ella L. Mills and Catherine S. Mills, Westfield, N.J.; Ruth Wheaton Johnson, 1615 Ravenna Blvd., Seattle 5, Wash.; William E. Russell as Trustee L/W/T or Ida R. Simmons F/B/O; Mrs. E. S. Fenton, c/o Russell and Russell, 41 East 42nd St., New York 17, N.Y.; J. Streicher & Co., 2 Rector St., New York, N.Y. Partners of J Streicher & Co. are: Joseph Streicher, Jack L. Streicher, Ethel Streicher, Judson Streicher all of 2 Rector St., New York, N.Y.; J. V. McManus, 19 Broadway, New York, N.Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

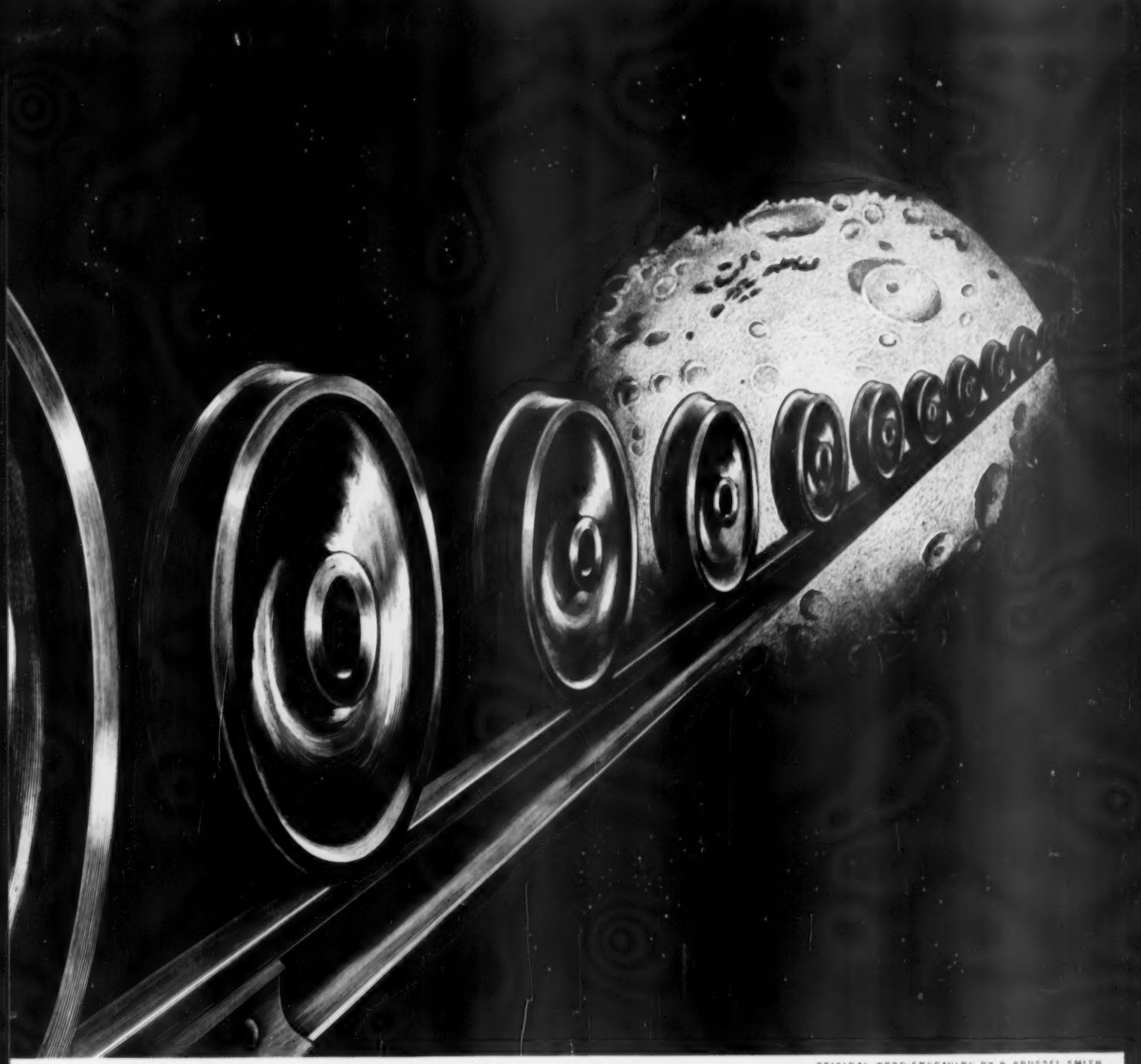
4. Paragraphs 2 and 3 include, in cases where the stockholder or other security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

H. C. WILCOX,
Editor

Sworn to and subscribed before me this 22nd day of September, 1955.

EDMUND J. PUYDAK
Notary Public, State of New York No. 41-3179300
Qualified in Queens County
Certs. filed with New York Co. Clk. & Reg.

(SEAL) (My commission expires March 30, 1957)



ORIGINAL WOOD ENGRAVING BY R. BRUSSEL-SMITH

these cast steel wheels are rolling back!

It's 238,857 miles to the moon—yet many Southern* cast steel wheels have already covered this distance and are well on their way back! In fact: five test cars have averaged over 275,000 miles, and one has rolled up more than 350,000!

Road tests on Southern cast steel wheels have taken *eight years* to run. They have yielded valuable experience that cannot be obtained in any other way. Laboratory tests and accelerated life tests are vital too—we were running these on our cast steel wheels over ten years ago—but in actual service there is no substitute for the test of time.

You can put this time-proven, service-proven, machined-tread Southern wheel under your freight cars for *lower cost* than other steel wheels.

SOUTHERN WHEEL DIVISION

AMERICAN Brake Shoe COMPANY

230 PARK AVENUE, NEW YORK 17, N. Y.

A-843

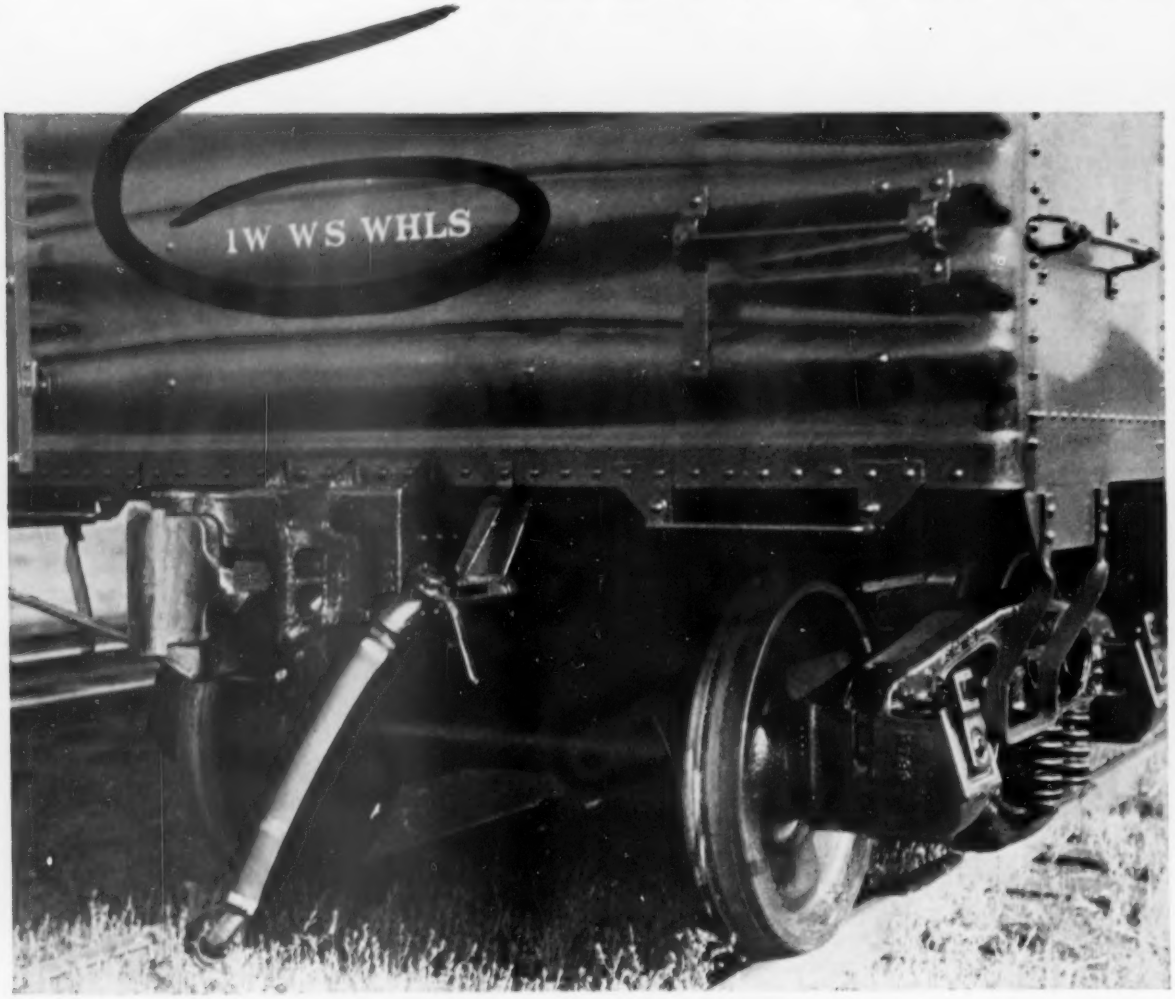
Why Not WROUGHT STEEL Wheels For Freight Service Too?

Wrought steel wheels are standard for diesel and passenger car service, because they are the best available. Why take less than the best for your revenue-producing freight service? Here's what you get in Armco One-Wear Wrought Steel Wheels:

- **Long life—usually still serviceable when car needs major repairs**
- **Faster freight schedules with greater safety**
- **Shipper satisfaction—less train delay to set out cars**
- **Reduced maintenance**

Armco One-Wear Wrought Steel Wheels have the strength and toughness found *only* in a forged and rolled wheel. They have demonstrated their superiority in freight service for more than 20 years—are the product of a plant with 46 years of wrought steel wheelmaking experience.

Your freight cars are worth the best. Investigate these wheels. Just contact the nearest Armco District Office or write at the address below.



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3 YEARS without repacking and...

LOOK AT THE PLYPAK AND PACKING →

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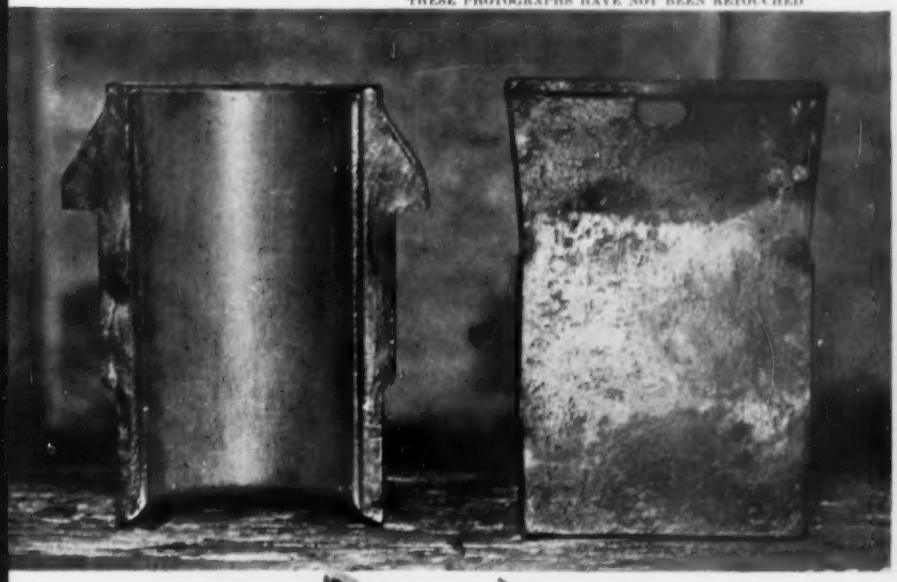

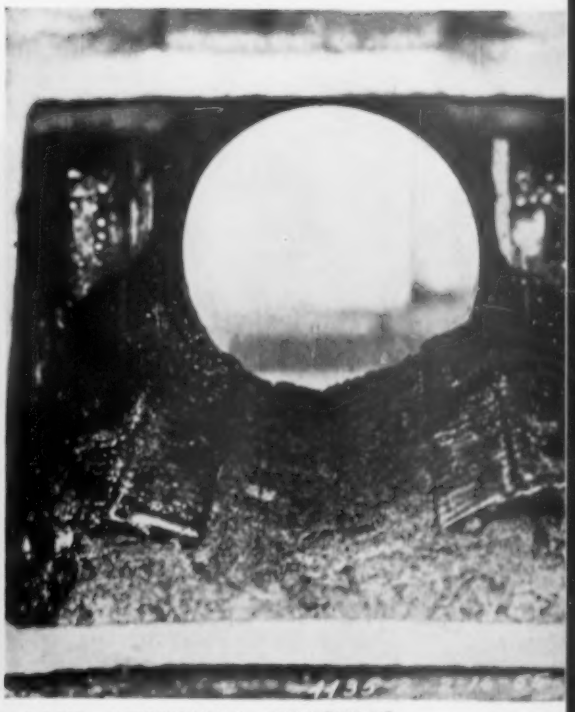

LOOK AT THE WEDGE AND JOURNAL BEARING

"NO hot boxes"

The Engineer of Tests of an important railroad reporting on 36 month test of PLYPAK equipped cars reports:

"THERE HAVE BEEN NO HOT BOXES TO DATE."

For hot-box prevention over the years, specify

PLYPAK

WASTE CONTAINER AND RETAINER

UNLIMITED A.A.R. APPROVAL

The PLYPAK has A.A.R. approval for unlimited application in interchange for those roads desiring its use — protected in interchange. See rule 101

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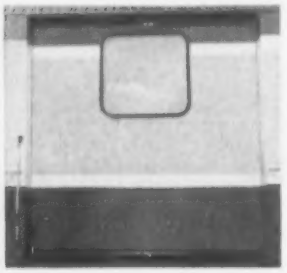
MET-L-WOOD DOORS

METAL BONDED TO PLYWOOD

★ LIGHT... TOUGH... DURABLE
★ NO THROUGH-BOLTS
NO WARPING
★ NO TWISTING
NO SWELLING

BAGGAGE AND POSTAL CAR DOORS



Completely weatherproof Met-L-Wood doors effectively prevent internal rust and rot... and their tough, smooth surfaces stay new-looking for years. Stainless steel channels along bottom edges of sliding doors are rustproof... virtually wearproof. All-rubber window sash installed or removed in minutes... rattleproof... water- and weatherproof. Available in full width and split types ... sizes to meet all needs.

Exclusive Split Door Seal

Drawing above shows simple Met-L-Wood Split Door Seal which assures weather- and watertightness for years of continual use. Seal also provides effective cushion when closing split doors.

PASSENGER CAR END, VESTIBULE, INTERIOR DOORS

Sound-deadening, insulating, vibration-damping Met-L-Wood doors for passenger cars add to service life, cut deadweight ... Combine modern, clean-line beauty with great strength and durability. Furnished for manual or automatic operation, with or without hardware assembly. Tapping plates for hardware are built into doors ... invisible additions to strength and trouble-free service life. Sizes and types to fit all requirements ... exact dimensions insure quick assembly and perfect fit. Door thicknesses from ½" up, as required.

CABOOSE DOORS

Met-L-Wood caboose doors are built to last the life of the caboose—and to give trouble-free service the whole time. Weather-proof, warp-proof, rot-proof doors can be provided with or without stationary windows in all-rubber sash or with standard drop sash. Available with or without hardware. In all sizes to exactly meet specifications.

DIESEL LOCOMOTIVE DOORS

Widely used by builders on new locomotives, Met-L-Wood doors guarantee trouble-free operation of end and interior doors on diesel road locomotives and cab doors for diesel switchers. Furnished to exact dimensions, with or without windows; either with hardware installed, or with tapping plates placed for hardware assembly on the job.

Write for this Bulletin

Met-L-Wood Bulletin 520 gives the complete, illustrated story on Met-L-Wood doors for railroad uses ... shows construction details, describes standard and special types and sizes. Your copy sent free upon request—write for it today.

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CORPORATION

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MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

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luggage rack with illuminated seat numbers

instantly identify seats from either end of car!

Now, with illuminated seat numbers located at the end of the brackets and directly over each seat, new convenience is added to the tested and proved features of Adlake Luggage Racks. A glance tells the passenger "This is your seat!"

Safe and sturdy, built to take abuse and loads. Sweeping in line, to harmonize with modern railroad car design, and finished for attractive appearance. No wonder Adlake Luggage Racks are the choice of railroads all over America!

For information or assistance in luggage racks, and facts about Adlake hardware for your cars, write us at 1152 N. Michigan, Elkhart, Indiana.

Adlake 98th year of serving the transportation, building and central industries

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We are proud of the product that has won the confidence of the railroads whose emblems travel the rail freight lines of America on International Cabooses. Now, with expanded car-building facilities we are better than ever equipped to talk to you about your caboose requirements.

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RAILWAY CAR CO

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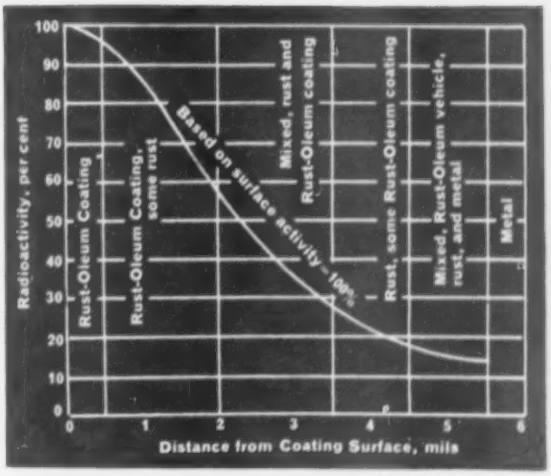
Here's how **RUST-OLEUM** *penetrates rust* to bare metal on your rusted surfaces as seen through the "eyes" of radioactivity

Geiger Counter Traces Rust-Oleum Penetration Through Rust to Bare Metal

When you apply Rust-Oleum 769 Damp-Proof Red Primer directly over rust, the specially-processed Rust-Oleum fish oil vehicle works around the rust particles, through the fissures in the rust formation, and into the pits in bare metal—driving out air and moisture. *Irrefutable proof* of this penetration is now yours . . . the results of nearly three years' research utilizing radioactive tracing with C^{14} radioisotope.

The methods and results of this research are presented in a complete thirty-page report, entitled "The Development of a Method to Determine the Degree of Penetration of a Rust-Oleum Fish-Oil-Based Protective Coating into Rust on Steel Specimens," prepared by Battelle Memorial Institute technologists. Clip the coupon to your letterhead for your copy. There is no cost or obligation.



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Rust-Oleum is distinctive as your own fingerprint. Accept no substitutes. Be sure you get only genuine Rust-Oleum.

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any way you look at it– inside or out...

the improved AMCCW Chilled Car Wheel is stronger, safer, better than ever

- Harder-than-steel tread metal
- Tougher, more resilient hub to dampen shock
- Best freight car safety record by ICC figures
- Faster to bore, easier to mount
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In industry, in the aircraft and automotive fields, wherever nuts must be run down and tightened or loosened and removed, SIOUX Impact Wrenches are slicing minutes to seconds.

MODEL NO. 325 — $ 99.75
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SIOUX'S GOT THE POWER!

SIOUX'S GOT THE DEPENDABILITY!

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USE SIOUX ALL THE WAY THROUGH

STANDARD THE WORLD OVER...

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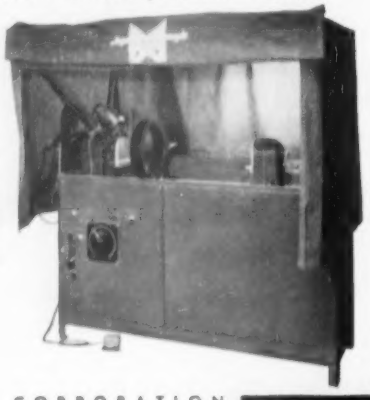
ELECTRIC IMPACT WRENCHES • GRINDERS • FLEXIBLE SHAFTS • POLISHERS • DRILLS
HAND SAWS • SANDERS • VALVE FACE GRINDING MACHINES • ABRASIVE DISCS

Diesel crankshaft inspection with a Magnaglo RC-1925 unit at the NEW YORK CENTRAL Diesel Shop in Collinwood, Ohio.

Diesels are Different—

to find cracks in **precision** parts, you need **precision** testing equipment **designed for the job**

Zyglo ZA-37 unit in use for rapid and reliable testing of Diesel valves during overhaul—to find any cracks from service.



Magnaglo DRC unit—maximum sensitivity in inspection of pistons, rods, pins, gears, injectors, etc. Fast, low cost inspection for shops where any Diesel work is done.

● With Diesels, you must inspect many more precision parts for cracks than you ever had with steam. For example, cracks are serious in pistons, piston carriers, rocker arms, injectors, connecting rods, crankshafts and others. In any of these parts, cracks may mean road failure, high-cost unscheduled repair, severe damage.

Magnaflux* designs and builds the equipment used by most railroads to find *all* cracks in every working part in a Diesel. Fast, cheap-to-use, and nondestructive, this equipment meets the testing need in each kind of Diesel shop.

THE MAGNAGLO* RC-1925

For major Diesel shops, this unit provides fast low cost inspection of all working parts made of magnetic metal—no matter how big. Crankshafts, axles, and other major parts get quick, positive crack detection that cuts the time and cost of *safe* overhaul. Any small part is easily tested, too.

THE NEW ZYGLO* ZA-37

Makes certain that no cracked exhaust valves, aluminum pistons, or other nonmagnetic parts will get back into service because of "the crack that couldn't be found."

MAGNAGLO* DRC-543

The ideal unit for "topping" inspection in turn-around shops where Diesels must be back on the road in the shortest possible time. Offers maximum sensitivity in fast inspection of pistons, heads, rods, pins, gears, injectors, etc.

Magnaglo and Zyglo units *for railroads* are *built* for railroads. Marking every crack with a glowing fluorescent line, they are the only equipment giving positive detection of crack-type defects, with least man hours. They are recommended by railroad authorities as the "standard" accepted test for crack-type defects.

Write today for free interesting bulletins and technical reports telling how railroads are using Magnaflux' testing methods to increase the dependability and availability of their Diesels. No obligation, of course.

*Magnaflux, Magnaglo and Zyglo are registered trademarks of Magnaflux Corporation.

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50-ton, 53'6" Flat Car with One-Piece Underframe.

INSURE YOUR INVESTMENT in Modern Freight Cars

50-ton, 22 cord capacity Pulpwood Car with Commonwealth Cast Steel Underframe and interlocking cast steel end posts.

with Commonwealth One-Piece Cast Steel Underframes

Flat cars, pulpwood cars, ore cars and many other types of quality freight cars with Commonwealth Underframes assure superior, better-built equipment providing such advantages as:

- **Greater Strength with Less Weight**
- **Longer Service Life**
- **Lowest Maintenance Costs**
- **Greater Availability**
- **More Revenue Per Car**

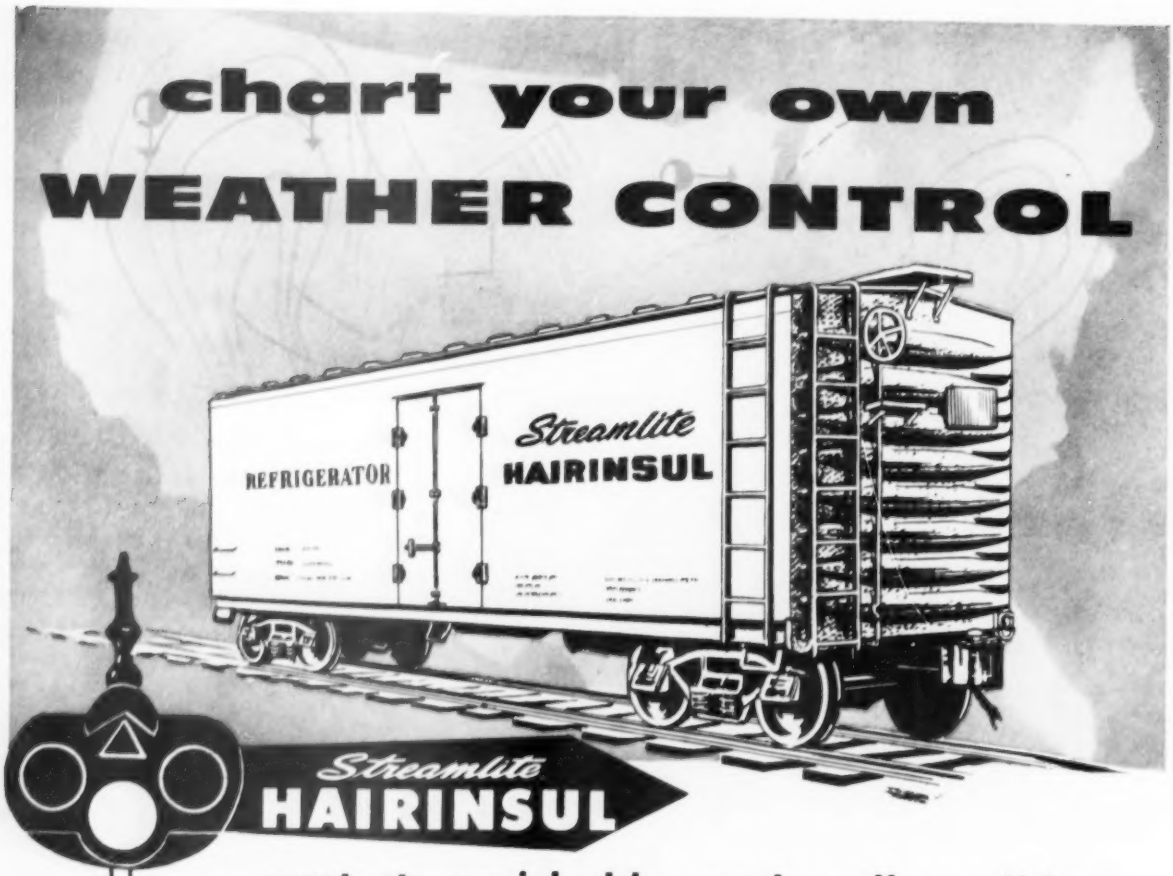
. . . and Commonwealth One-Piece Cast Steel Underframes are available in all standard sizes.

Plan wisely for the future and insure your investment—equip *your* quality freight cars with cast steel underframes.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. EDDYSTONE, PA.

chart your own WEATHER CONTROL



Streamlite HAIRINSUL

protects perishables under all conditions

- **LOW CONDUCTIVITY.** Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT.** Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT.** Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.
- **EASY TO INSTALL.** Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.
- **COMPLETE RANGE.** STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE.** The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.

Shipments of valuable perishables are at the mercy of extreme temperature changes unless properly protected. Only an efficient refrigerator car insulation can reduce this hazard.

Leading refrigerator car builders recognize this. That is why, for the better part of a century, they have been specifying all-hair insulation. They know that STREAMLITE HAIRINSUL is the one insulation that is fully efficient under all weather conditions — hot or cold — no matter how severe.

Other reasons why car builders specify STREAMLITE —there are more. Write for complete data.

MERCHANDISE MART, CHICAGO 54

Streamlite HAIRINSUL
AMERICAN HAIR & FELT CO.

SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

When You Compare Draft Gears...

Make sure you get *all* the facts.
Insist on seeing performance figures
obtained from *test track* runs...
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modern *electronic* equipment...
under *actual* operating conditions.

National *Rubber-Cushioned*
Draft Gears give you protection
when you need it —
at high impact speeds!

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY
Cleveland 6, Ohio

AA-3266

Still perfectly lubricated . . . after 2 years and 85,149 miles

THIS freight car roller bearing, in service on a Class I road, was packed with approximately two and a half pounds of *Texaco 979 Roller Bearing Grease* on August 8, 1953.

On June 30, 1955, when the unretouched photo above was taken, the bearing had been in continuous service for 85,149 miles.

Note that there is no indication of "souping" and that the bearing is still fully packed. The *Texaco 979 Roller Bearing Grease* has stayed in the bearing, retained its original consistency, and no additional lubricant will have to be added for at least another year.

Those are among the reasons why more and more leading railroads are adopting *Texaco 979 Roller Bearing Grease* – gaining better lubrication, longer bearing life and lower maintenance costs.

A Texaco Representative will gladly help your road enjoy these benefits. Just call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

☆ ☆ ☆

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

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EDITORIALS

Looking Back on a Meeting

Since 1939 the Coordinated Mechanical Associations have come a long way. The increases in membership since that time are not just an evidence of progress and success but are, above all, tangible evidence of the value of the associations to the railway industry and the continually increasing interest both in the meetings and the exhibits. There have been those who have suggested that, from many standpoints, these meetings in Chicago are now the prime mechanical meetings of the American railroad industry. Be that as it may; time will tell.

It is always well to re-state purposes, functions and objectives. No one should forget that these Coordinated Mechanical Associations are concerned primarily with the problems of maintenance and servicing of locomotives and cars. Their *only* relation to equipment design and standards is the privilege of recommending changes that will simplify and reduce the cost of equipment maintenance. The AAR Mechanical Division has the sole responsibility for adopting standards and administering the application thereof. Thanks to watchful executive committees the coordinated groups have rarely wandered far outside of their own jurisdictions. They can deal with physical problems; they can deal with organization problems as they relate to maintenance but a word of caution might be worth while at this time with respect to problems relating to organized labor, whether discussions deal with the rank and file or supervisory personnel. Such subjects or discussion do not belong in these programs.

It may also be time for these groups to consider the advisability of bringing together the vast amount of information developed over the last 10 or 15 years into some form of permanent record, such as a manual, so that anyone can find, in one place, any of the data that are needed in everyday maintenance operations. Each of the four associations should appoint a committee to explore the desirability of bringing into being a record of the findings of the many committees of the Air Brake, Car Officers', Locomotive Maintenance Officers, and the Fuel Associations that have had far reaching influence on today's maintenance practices and facilities and could serve as a guide to the future.

The 1955 meeting, like the others, was a success

Suppliers and the Railway Progress Institute

Manufacturers who supply railroads have for years been subjected to railroad criticism because of lack of support for railroad public relations objectives. There is no longer any lack of definition as to what railroads want—and what they need if they are going to look forward to a prosperous future. There is no longer any good reason why the supply industry should not become just as active as railroads in advancing these objectives. Recently a forward step has been taken.

Railway supply leaders have provided the machinery for engaging in increased educational effort on the railroads' behalf—the Railway Progress Institute. A relatively inactive Railway Business Association has been reorganized as the RPI because of the deep interest some railway suppliers have in giving support to the legitimate objectives of the railroads. Holcombe Parkes, one of the country's top professionals in the field of public relations has been chosen as president. Mr. Parkes has a railroad background and knows the problem from the inside as well as without.

The main task confronting the RPI now is explaining to suppliers about their more active program which requires increased dues. Leaders in the railroad industry are strongly in favor of this increased activity. The selfish interests of suppliers are aided by improving the competitive position of the railroads. The railroad industry would be a better customer if the railroads had a freer hand in making competitive rates, and if their competitors were paying more nearly compensatory charges for the use of government property. The assignment of a small part of supply industry revenues to public education about the railway problem does not come under the heading of charity but rather under "enlightened self interest."

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RAILWAY LOCOMOTIVES AND CARS

Pennsylvania Building Production Line Car Shop

Samuel Rea Car Repair Shop is being tooled for 50 heavy freight car repairs daily and has cost $12,000,000.

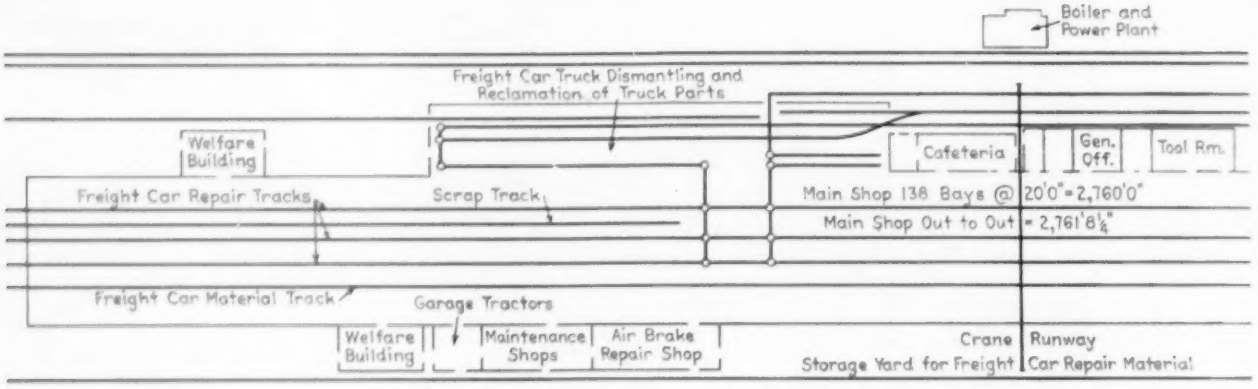
Flexibility, ample space, and high capacity are all features that have been included in the Samuel Rea Car Repair Shop now nearly completed at Hollidaysburg, Pa. Already the Pennsylvania is getting cars out of its new $12,000,000 plant. When the three production lines are in operation, there will be an output of fifty cars daily. The shop is being tooled to make heavy repairs on any type of freight car and the Pennsylvania has about 130,000 of them—the largest fleet in the country. To repair these cars they have built what is claimed to be the largest shop under one roof.

Hollidaysburg is ten miles south of Altoona, long the center of Pennsy mechanical department operations. Freight car repairs are being moved from Altoona to Hollidaysburg, and eventually Altoona Works will only rebuild locomotives and passenger cars. The building of new freight cars and the fabrication of freight car parts will continue at Altoona.

The site at Hollidaysburg is located on a PRR line that parallels the main line but by-passes the Horseshoe Curve and Altoona. Today there is little through movement over this route except when the main line cannot be used. In the past, this by-pass was regularly used

The 700,000 sq ft of Rea shop has illumination intensity of 35 ft candles produced with nearly 25 mi of fluorescent fixtures. Cars shown are being repaired in the shop prior to establishment of production lines.

Sheltered unloading platforms in front of modern warehouses, and a large outside storage area serviced with overhead cranes serve the stores department facilities which will expedite materials handling and stocking.



The 2760 ft length of this shop when tooled for production line repairs will see cars mov-

by some through freights, and Hollidaysburg had a hump classification yard and a large locomotive terminal. All this ended years ago, and the Hollidaysburg facilities were either abandoned or used only for storage.

Weatherproof Production Line

In 1949 studies were started with the aim of weatherproofing Pennsy car repairs. It was known that it was worth-while to get as much of this work as possible under roof and no longer subject to interruptions caused by rain and cold weather. At the same time, it was decided that a production line might be established if there were facilities for accumulating sufficient cars of the same type. Successful production-line repair requires steady flow.

The site at Hollidaysburg was selected because in the former classification yard was sufficient area for the huge plant that was planned. Part of this yard would provide the track space for accumulating cars in sufficient numbers to justify production-line repairs. A minimum of grading was required. Finally, the proximity of the Altoona shops and the reclamation plant permitted integrating all these operations with the Samuel Rea Shop.

Construction of the new car shop was authorized in June, 1952 and work began in October, 1952, when the removal of the hump was started. The summer of 1955 saw the first car turned out. Late fall sees the starting of two of the production lines. During 1956 the shop should be approaching its rated output.

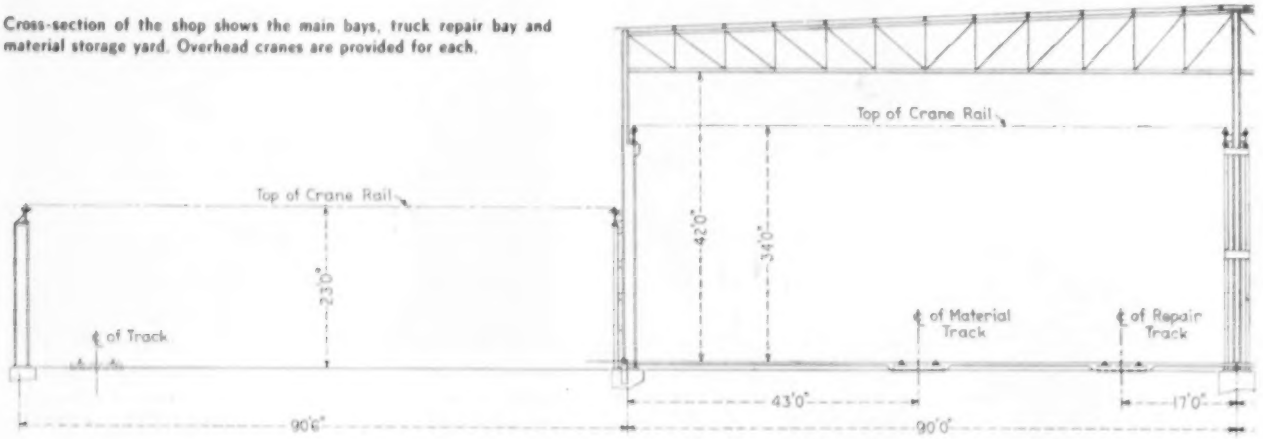
"Largest Under One Roof"

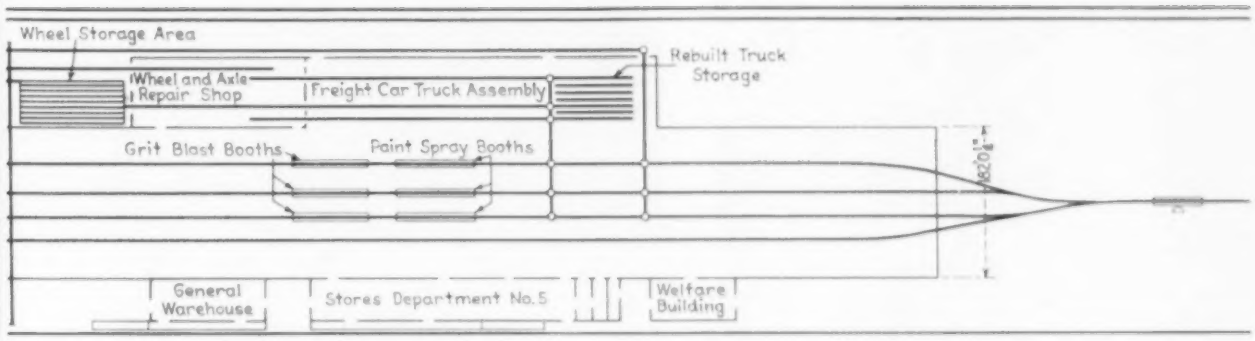
The "largest car repair operation under one roof" is the way the Pennsy describes the Samuel Rea Shop. There are about three miles of railroad track installed under the 704,472 sq ft of roof. The main shop is over 2,760 ft long and has a width of 180 ft. Along the north side are two large bays used for truck and wheel work. The main shop and these two truck bays are floored throughout with 6 in. of concrete.

Shop offices, tool room, cafeteria and locker rooms are also built along the north wall. Much of the south side of the building is occupied with stores department facilities. These are two warehouse buildings covering over 30,000 sq ft and equipped with covered unloading docks. There is also an outside storage area about 800 ft long served by two overhead cranes. The south side of the main shop has maintenance bays and a garage for storing and maintaining the material-handling truck equipment which will service the shop. Additional locker rooms and an air brake repair bay are also located here.

East of the shop is a scale for light-weighing the cars after they are rebuilt. This scale was formerly part of the

Cross-section of the shop shows the main bays, truck repair bay and material storage yard. Overhead cranes are provided for each.





ing from west to east—left to right in this floor plan. Entire operation will be under roof.

equipment of the Hollidaysburg classification yard. It was renovated and lengthened before being installed at the Rea shop. North of the shop building is a service building containing two 500 hp oil (or gas) fired boilers, and two 3,000 cfm synchronous-motor driven air compressors. Locker rooms, offices, cafeteria and some smaller work areas will be heated with steam-fed space heaters. The boiler plant will also heat wash water for the locker rooms. The main repair areas of the shop will not be heated.

An acetylene plant and an oxygen supply unit are being installed near the shop and will be operated by outside vendors. Natural gas and electricity are purchased from local utility companies, and water is procured from a PRR subsidiary. Sewage disposal is handled by the borough of Hollidaysburg.

Car Repair Operations

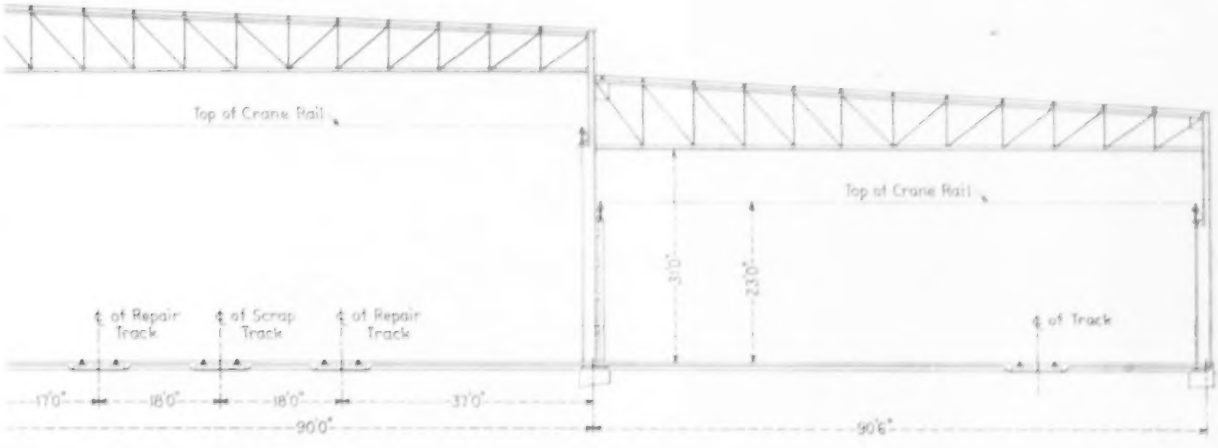
Production lines will be operated over three tracks that run the full 2,760 ft length of the building. A fourth full-length track at the south side has been designated for material handling, but could be used for production if the need arose. Maximum flexibility has been built into the three present production-line tracks which can be tooled to make repairs on any type of freight car. It is possible that all three lines may be repairing the same class of car at the same time. It is equally probable that each line might be doing a different type of car. Along the entire length of the tracks are key-slots in the concrete floor. They will be used for erecting PRR-designed portable scaffolding. This can be set up and dismantled as the production picture changes.

Service boxes are provided on each side of each track on 40-ft centers through the shop. This permits the use of short hoses, short welding cables, and short electric lines. It leaves the shop floors open for the movement of material trucks.

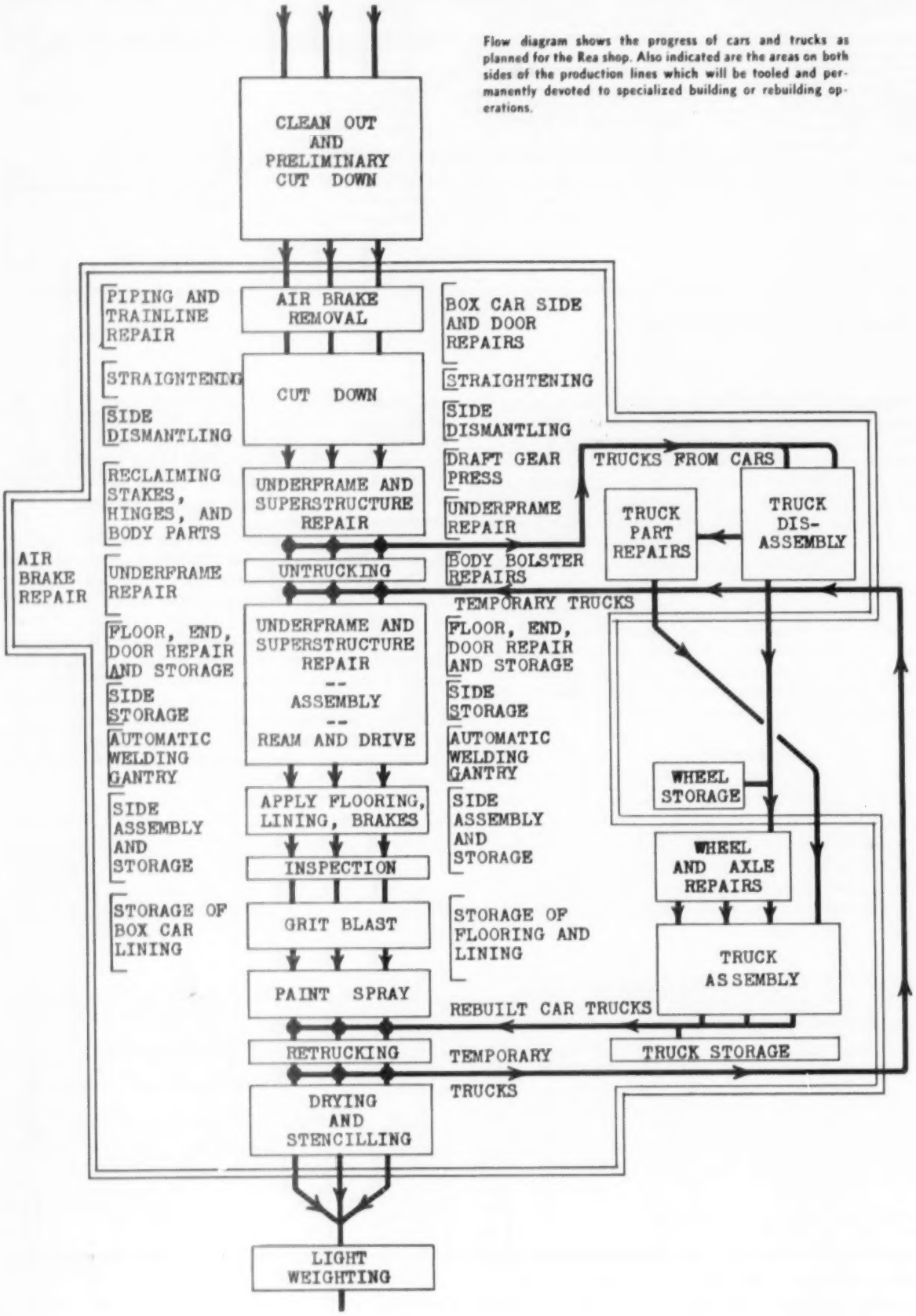
While there is a maximum of flexibility in the production tracks, the north and south walls of the shop will be filled with permanent equipment. There will be a set of jigs for repairing box car sides and doors. Numerous specialized machines will be devoted only to the repair of hopper car parts. Because of their specialization, some of these areas will not be operated during certain repair runs.

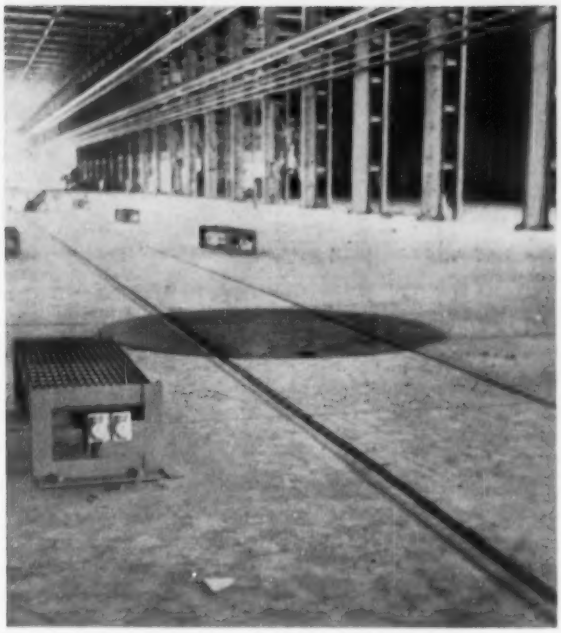
Truck Repairs

After the cars are cut down and ready for rebuilding, they are transferred from their own trucks to temporary shop trucks. The road trucks then move into the first of the truck areas for dismantling. Wheels are cleaned and



Flow diagram shows the progress of cars and trucks as planned for the Rea shop. Also indicated are the areas on both sides of the production lines which will be tooled and permanently devoted to specialized building or rebuilding operations.





Turntable installed in the shop floor is duplicated at many points where car trucks leave or enter production line tracks. Air, oxygen, acetylene and electric current for welding and for operating lamps or shop tools are supplied from the service boxes spaced at frequent intervals along the production tracks.

moved to the wheel and axle shop. Side frames and other truck parts are built up, annealed and transferred to the truck assembly area. Here the restored axle and wheel sets, and the rebuilt truck components are reassembled and move back into the main production line. In the meantime, the body has been rebuilt and inspected. After the blasting equipment is installed, cars will pass through a grit blast for cleaning prior to painting. Also scheduled for delivery next year are traveling paint spray booths which will be installed over each of the production tracks and will follow the grit blast operation.

The freshly-painted, rebuilt body then goes back onto road trucks. The temporary shop trucks that carried the car through the assembly, cleaning and painting operations move back up the production line for reuse. The car is stenciled while still in the car shop. Finally it moves out on to the scale for light-weighing.

Car movement through the production line is to be accomplished by floor-mounted winches which will have the capacity to move up to four cars at one time. Twenty-four of these winches will be installed along the three tracks. Material will be moved to the production lines with shop trucks and with overhead cranes which span every bay. These overhead cranes also will be used in some of the production operations.

A daily output of 50 cars from the new shop is based on two shift operation of each of the three repair tracks. Third shift activities would be devoted to cleaning up and restocking the production line for the next day's operations.

What Makes the Rea Shop Run?

(Examples of equipment being installed)

6 Transformer and switching stations with a total of 14,000 kva. There are two 1,000-kva units and four 3,000 kva-units.
2 500-hp automatic boilers for oil or gas firing.
2 3,000-cfm air compressors with 500-hp synchronous motors.
16 Overhead traveling cranes. All have spans of approximately 90 ft, and capacities range from 7.5 to 25 tons.
24 Car-pulling winches.
3 Grit blast units.
3 Traveling paint spray units.
1 Freight car scale.

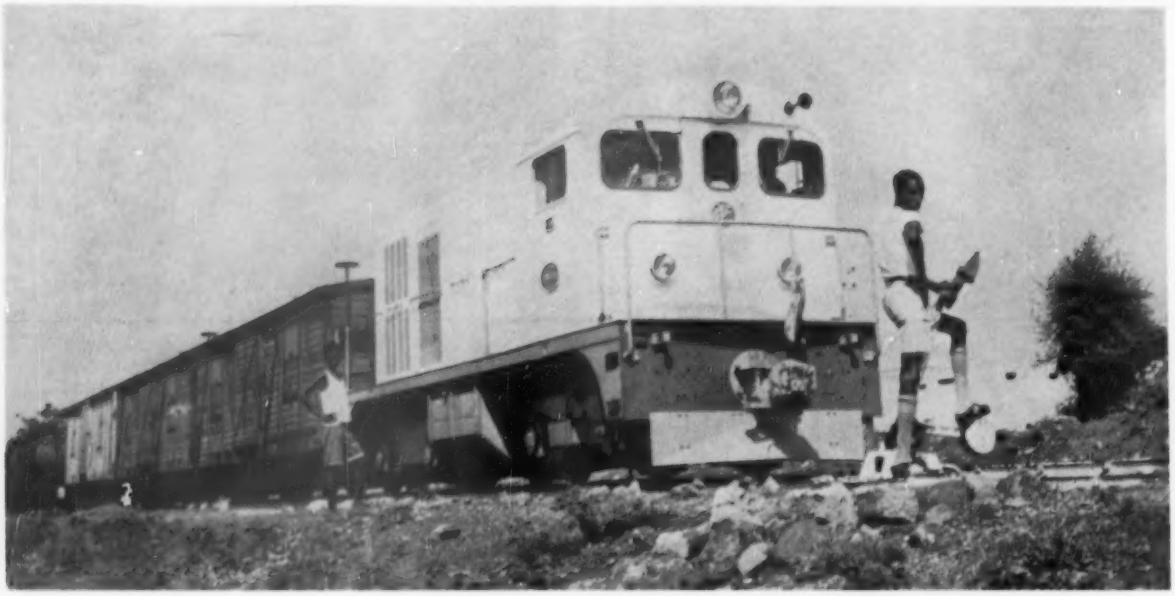
Trucks from cars being shopped are torn down and rebuilt in two bays on the north side of the main shop. Both these truck sections open into the main area and cross tracks are used to move the trucks into and out of them.

What About Altoona?

The Samuel Rea Car Repair Shop is operated as a part of the Altoona Works, and is under the direction of the works manager. The establishment of the new shop requires changes in the car repair organization as widely scattered groups at Altoona are consolidated at Hollidaysburg.

While it could be utilized for car assembly, this new shop is primarily a repair operation. The equipment and layout at Samuel Rea has been chosen and designed for straightening, welding, restoring and assembling car components. Production of new parts—operations typically requiring shearing, punching, forming and forging—will continue to be done in the well-equipped fabricating shops at Altoona.

Repairs completed, final step will be light weight determination on this 63-ft scale located just beyond the switches where the three production line tracks converge into a single outbound track.



Looking much like American switchers, some of the meter gauge Alsthom units are already in road service although the last unit is not scheduled for delivery until November.

In Africa as in the U.S.A. . . .

Railroad Is Completing Dieselization

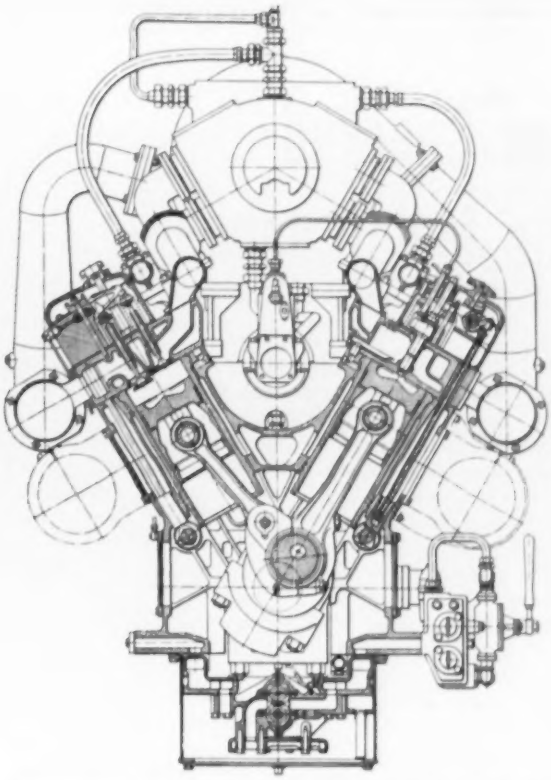
R. J. Bender
assistant to the president
Sinclair Petroleum Company

Railroads on every continent are becoming completely dieselized. November will see the end of steam operation of the Franco-Ethiopian Railroad when this 500-mile narrow-gage line receives the last of its new diesel road locomotives. The first major step was taken in 1950 when the railroad received twelve 580-hp Swiss-built diesel-electrics. Previously the line had operated a number of diesel powered Fiat rail cars providing passenger service between its main cities several times a week.

The Franco-Ethiopian operates from the Red Sea coast in French Somaliland westward across deserts as it ascends to the 8,000-ft elevation of the Ethiopian plateau and reaches the Ethiopian capital of Addis Ababa. In the first 200 miles of this east African line—the desert section from Djibouti, Somaliland, to Dire Dawa, Ethiopia—there are frequent sand storms and only limited supplies of very poor water. This was the section of the road that was first opened 50 years ago and is just now being rebuilt to more modern standards. The line that climbs from Dire Dawa to Addis Ababa was built more recently and to higher standards. The climate here is temperate.

The desert section was the first to be dieselized. The 1950 locomotives had to be specially built with an axle loading of only eight tons and with sealed and pressurized cabs to keep out sand. These units have special air filters, and high-capacity radiators for adequate cooling at torrid desert temperatures. By 1954, after four years of opera-

Imperial inspection—Emperor Haile Selassie and the president of the Franco-Ethiopian line leave the cab of the first unit delivered.



Cross-section of the 675-hp V-type MGO diesel which is used in the Alsthom road units now being delivered.

tion, the 12 SLM road units had established performance and economy records which led to an order for additional road power and also for 10 switching locomotives. The Franco-Ethiopian had found that its serious desert water problem had been eliminated. The units were operating at one-third the cost of coal-fired steam locomotives and at half the cost of the oil-fired Mikados. Service has been speeded by eliminating water stops and utilization improved because of more rapid turning. By August 1955 two of these original locomotives reached their half-million kilometer mark—310,000 miles, and all had over 250,000 miles of service.

The expense of equipping units for desert service did not have to be repeated to dieselize the remainder to the railroad. The six Alsthom locomotives are a standard type which has been built for service in many countries including Holland, Spain, Pakistan and Madagascar. They have the same mechanical and electrical equipment irrespective of the track guage for which they are built. The 12-cylinder MGO diesel engine is built with a crankshaft that has main and crank journals of the same size. This means that only one size of the steel-backed copper-lead bearing shell has to be stocked. The engine has an outside oil pump independent from the normal one which makes it possible to drain the oil without unplugging the crankcase and also allows oil to be circulated prior to starting the engine.

The main generator powers four traction motors. These locomotives in service on the western end of the railroad can have an axle loading of 11 tons and do not have to have the idler axles used on the 1950 units. The locomotives are shunted manually when accelerating, but make backward transition automatically. A nine position electropneumatic throttle controlls the engine speed. Pressurestats shut down the engine automatically if lube oil pressure drops below 21 psi or if water pressure drops below 3 psi. Thermostats protect against overheating.

Ten switching locomotives were purchased at the same time as the last six road units. These switchers all have hydraulic transmissions. This transmission was chosen because of the lower possible continuous speed. Also it was felt that this transmission would be less subject to high humidity—a factor at the railroad's seaport terminal. The locomotives are considerably lighter than comparable diesel-electrics.

Although the end of steam means that locomotive water no longer is a problem along the Franco-Ethiopian line, the storage and distribution of water has been continued. It is the only supply for many of the people along the railroad. The completion of Franco-Ethiopian dieselization in November 1955 coincides with the 25th anniversary of emperor Haile Selassie's ascension to the Ethiopian throne.

FRANCO-ETHIOPIAN'S METER GAUGE DIESELS:

Service	Road	Road	Switcher	Switcher
Number of units	12	6	6	4
Type	A1A-A1A	B-B	C	C
Date built	1950	1955	1955	1955
Builder	SLM, Switzerland	Alsthom, France	Coferna, France	Billard, France
Horsepower	580	675	207	276
Diesel engine:				
Arrangement	In line	Vee	In line	Vee
Supercharged	Yes	Yes	No	No
Cylinders:				
Number	6	12	6	8
Bore	*	6⅞-in.	4⅞-in.	4⅞-in.
Stroke	*	7⅛-in.	7⅛-in.	7⅛-in.
Builder	SLM	MGO	Poyaud	Poyaud
Transmission:				
Type	Electric	Electric	Hydraulic	Hydraulic
Builder	Brown-Boveri	*	Voith	Voith
Weight, metric tons	55	46	*	*

*—Information not available.

Multiple-unit locomotive using two of the SLM units crosses one of the high trestles at the eastern edge of the Ethiopian plateau. Railroad's motive power chief said that what he needed to pull trains in the desert country was a "slow speed sand submarine."

Air Brake Association Has Sparked Changes in Equipment and Maintenance

C. V. Miller
President

L. Wilcox
Sec.-Treas.

Exchange of ideas, discussion, and education have all been goals of the Air Brake Association since it was formed in 1893. The 47th meeting heard these aims restated by C. V. Miller, president. The group has fostered progress and invention through its work, according to Mr. Miller. Supporting his remarks are two recent developments that have been preceded by many association discussions. The success of the pressure maintaining valve was reported at one session devoted to discussing the 1954 Convention-In-Print in which a paper on this subject was printed. For years the association has been discussing methods of preventing undesired brake actions caused by train line leakage. The pressure maintaining valve compensates automatically for leakage and is speeding train operation.

Location of leakage in train lines, subject of many ABA papers, must be corrected on car repair tracks. A device for making a better single-car brake test has now been submitted to AAR member roads for letter ballot action. The reasons for developing the flowrator included in the redesigned single-car tester were explained, and the methods for making the revised test were given.

CD Compressor Maintenance Practices Vary

A survey of 14 railroads by the St. Louis Air Brake Club showed that what would be regarded as satisfactory lubrication and maintenance practices for the 3-CD compressor by one railroad would be considered unsatisfactory by another. The study did not attempt to determine what is the best lubrication or maintenance procedure, but was aimed at improving compressor performance and service life. The study showed there is no definite standard for satisfactory air compressor performance.

Although the complete rebuild period varies widely, the removal and cleaning of heads and valves is done more frequently. When there is no set time for this work, failure to pass the orifice test is used as a guide. On a time basis, railroads do head and valve work on a quarterly, semi-annual, and annual basis. To avoid burning up the compressor through a high-pressure discharge valve failure, some roads replace these valve discs each six months. If the discs are in good condition, they are then moved to other less critical locations.

Chrome plating is the most popular method of reclaiming both crankshafts and cylinders. Most roads do not refinish crankshafts undersize, and after chrome plating, this is frequently impossible. To reclaim a grooved crankshaft, metal spray may be used to build up the oil-seal surfaces, but chrome-plating is used for the main bearing surfaces. The importance of fitting rings to cylinders was stressed. When pistons are replaced in reconditioned cylinders, they are turned 180-degrees from the original position.

Both honing and grinding are used for refinishing cylinders oversize. With either, a wall finish of 15-40 microinches is obtained. Grinding on an accurate grinding machine will give a round bore with proper alignment to the mounting flange. This will not always be obtained with honing, which, however, can remove small imperfections with a minimum amount of material removed. However, honing does tend to follow the low spots and may change the alignment of the bore.

Other maintenance practices important in good compressor performance include frequent filter inspection and change, suitable break-in run after overhaul, replacement of oil seals when they are soggy or whenever the crankshaft is removed, and cleanliness of the intercooler. Alignment of the compressor when it is being installed in the locomotive is important. It should not be permanently aligned with the engine until the engine is permanently installed and even the fuel tanks of the locomotive are filled. Locomotive frames are built with a $\frac{3}{8}$-in. arc which levels when fully loaded. This practice reduces compressor bearing troubles.

In maintaining compressors, there are two general problems. First, an acceptable performance and service life must be determined. Second, the shop facilities determine the amount of reconditioning and restoring that can be done. The committee believes that the higher quality of maintenance during overhaul, the less frequent the maintenance interval and the probable lower overall maintenance cost. The only general standard performance level is the furnishing of ample air and lack of oil passing.

Along with suitable maintenance, satisfactory lubrication is important. The type of lubricant to use can be based upon cost, availability, detergent and inhibiting properties, and viscosity. Roads generally use diesel engine oil, reclaimed diesel engine oil, or a special air compress or oil. The special air compressor oil can be a straight mineral oil without additives. In most cases, roads reported satisfaction

with present lubricants. The report was prepared by a committee of the St. Louis Air Brake Club and was presented by D. McIntyre, MP, the Chairman.

Compressor Lubrication

During discussion one speaker asked if it was possible that a shop could maintain diesel locomotives and not be able to service the compressors. The majority of roads use the diesel engine oil for compressors but there are tests of special lubricants being conducted. The Canadian National, according to C. C. Maynard, cleaned up a carbonized head condition by changing to straight mineral oil and dropping the main reservoir pressure. Heads are now removed annually. Another CNR man said that SAE 30 mineral oil is used, and that the main reservoir pressure was dropped from 140 psi to 120 psi. He said the result has been better service, cleaner machines, and sufficient air supply.

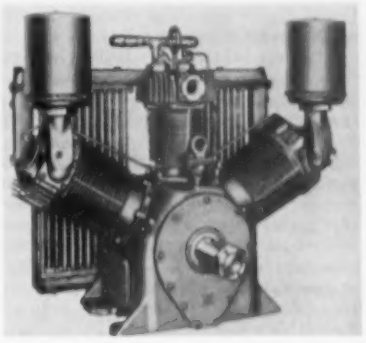
The Chesapeake & Ohio is using mineral oil and the Missouri Pacific is conducting tests with it. The Santa Fe cleaned up heads with special oil but has since been having bearing troubles. The AT&SF has reduced temperatures in compressors by installing a 3-in. discharge line and this has improved valve life.

Oil Carryover Vital Problem

The oil separators installed on diesel locomotives should be improved according to several members. The AAR Locomotive Committee has been considering this topic. The difficulty with present equipment according to L. D. Hayes, New York Central, is that only oil in the liquid form is removed, and the carryover which causes trouble is that which is in the vapor state.

The Missouri Pacific has not found a satisfactory separator. P. D. Hawkins, Erie, said that his railroad has encountered difficulty with fixed consist commuter trains. They feel that the vapor carry-over into UC passenger equipment is serious enough to cause poor brake operation, and that this same thing must be considered in the extension of cleaning time for the D-22 and D-24 valves now proposed. The Erie has had to clean the commuter UC equipment each six months because of carry-over.

The Frisco has replaced all armored hoses with standard rubber hoses according to A. M. Malmgren, general diesel and air brake supervisor. This followed a near accident when an armored hose collapsed and prevented the engineman from stopping a train. When an armored hose fails because of oil deterioration, there is no external indication that a blind gasket or choke has been formed. Since the public, management and operating men want safety and reliability, the Frisco has been making the change.



Westinghouse 3 CD Compressor

HOW ARE 14 RAILROADS HANDLING THE 3-CD COMPRESSOR?

	Answers	Majority
A. Lubrication		
1. What weight or viscosity of oil is used?	SAE 20 to SAE 40	SAE 30
2. How often is oil changed?	Adding by make-up, mileage, observation, analysis, quarterly, semi-annually	Quarterly
3. Is lubrication of compressor satisfactory?	13 yes and 1 no	Yes
4. What is minimum oil pressure permitted on compressors in service?	At idle 4 psi Up	4 or 5 psi
	At rated speed 15 to 35 psi	15 psi
B. Maintenance		
1. At what period are compressors removed from unit for overhaul?	One to six years	With engine overhaul
2. How often are heads and valves removed and cleaned?	Quarterly to Annually	Semi-annually
3. How often is lost motion between connecting rod bearing and crankshaft checked?	Quarterly to complete overhaul	Complete overhaul
4. How is lost motion between connecting rod bearings and crankshaft measured?	Visually and feeler gage	Feeler gage
5. What is done when crankshaft is grooved?	Grinding undersize in steps from 0.010 to 0.040-in., and chrome plating to original dimension	Chrome plating
6. What are tolerances on the following parts before they are scrapped, reground or plated?		
A. Crankshaft Throw:		
1. Tapered	0.002 to 0.040 in.	0.002 to 0.004 in.
2. Out of Round	0.001 to 0.010 in.	0.003 in.
3. When above limits are exceeded, what is done?	Scrapped, undersize steps, and chrome plating	Chrome plating
4. If refinished, what undersize steps are used?	0.010 in.	0.010 in.
B. High Pressure Cylinder:		
1. Tapered	0.002 to 0.030 in.	0.006 to 0.010 in.
2. Out of Round	0.002 to 0.030 in.	0.008 in.
C. Low Pressure Cylinder:		
1. Tapered	0.002 to 0.030 in.	0.008 in.
2. Out of Round	0.002 to 0.030 in.	0.008 in.
D. When above limits are exceeded, what is done?	Scrapped, undersize steps and chrome plating	Chrome plating
7. If cylinders are refinished oversize, what steps are used?	0.010 in.	0.010 in.
8. What method is used to refinish cylinders in oversize steps?	Micro-grinding and Honing	
9. Give clearances and condemning limits for parts listed below:		
A. L.P. Cylinder to piston: Minimum	0.004 to 0.010 in.	0.006 in.
Maximum	0.008 in.	0.008 in.
B. H.P. Cylinder to piston: Minimum	0.004 to 0.020 in.	0.004 in.
Maximum	0.006 to 0.008 in.	0.006 in.
C. Connecting rod bearing to crankshaft:	0.002 to 0.006 in.	0.002 in.
D. Total side clearance, three connecting rods:	0.006 to 0.020 in.	0.020 in.

Single-Car Leakage Test Undergoing Changes

Air leakage in train brake systems continues to be a major problem. Testing for Leakage on Repair Tracks was presented by M. J. Alger, Jr., of the New York Air Brake Co. It follows a number of other papers previously presented to the association on the subject of train line leakage. This paper reviewed the background of leakage studies and showed how this led to the redesign of the single car testing device.

The brake pipe of a train is the most important non-operating part of the brake system. Through this connected 1¼-in. pipe passes all the air necessary to charge and release all the train brakes. The brake pipe acts as an orifice and has all the characteristics of an orifice. The longer the train, the greater resistance there is to air flow. Once a brake system is fully charged, the only cause for air flow in the brake pipe other than to release or recharge is leakage. The average freight car has a minimum of 51 points from which leakage can occur when the car is fully charged.

Pinpointing Leakage

Of the points where leakage can occur, 27 or more are in the brake pipe itself. This leaves 24 points of leakage (including 17 in the AB valve) which are included in what is called system leakage. All of these points can be on the reservoir side of the charging port. Leakage occurring at these 24 points is not taken into account by any brake pipe leakage test. It results in an increase of air flow in the train brake pipe from the locomotive when the brakes are released and the train is charged.

AAR Air Brake Rule 25 (a) now requires that before a terminal air brake test is made, there cannot be a drop of more than 10 psi between the locomotive and caboose. This along with Rule 26 which now limits leakage to 5 psi per minute provide a check on the leakage of freight trains of any length. Long trains may have less than 5 psi per minute leakage and yet have a taper of more than 10 psi over the length of the train. When trains comply with the 10 psi taper requirement, it should assure enginemen that there will be little slack action caused by leakage.

In the individual car is much of the leakage in the made-up train, and it is the only part that can be checked. In establishing a maximum test value of total leakage from an individual car, allowance must be made for leakage that might occur from hose coupling gaskets when the car is coupled into a train. It cannot be predicted or tested on the repair track. Test rack tests by air brake manufacturers on 150 coupled sets or brake equipment showed that when a train line charged to 70 psi had leakage of 0.22 cfm per car, then such a train would comply with both the leakage and taper limits. This continued to be true when the brake pipe pressure was raised to 100 psi.

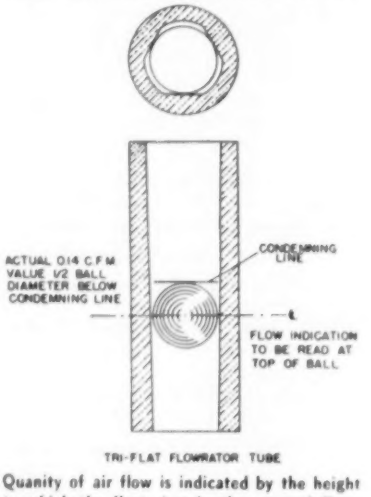
Flowrator Testing

Since 1952 tests have shown that it would be practical to test individual cars in a manner that would restrict allowable total leakage to 0.22 cfm. The amount of air flow necessary to maintain charged pressure with 0.22 cfm air loss is very small. A very sensitive device is required. The AAR Brake Committee has utilized a flowrator which consists of a ball float in a tapered glass tube which is calibrated to indicate the amount of air which is passing through the tube. The one used to check leakage from the brake system of freight cars is calibrated to read in cubic feet of free air per minute at 70 psi. Steady flow of air is necessary for quick and accurate check so a reducing valve that will maintain a constant pressure at the low rate of flow of 0.025 cfm of air in the charged line must be used as a regulating supply valve.

The Flowrator is used in conjunction with a diaphragm type by-pass cock. At the same time that the Flowrator was being incorporated in the single-car tester, the size of its air gauge was increased from 3½ to 4½ in. The Flowrator is placed between the old tester and the outlet (brake pipe) hose coupling. It must be reasonably vertical when it is used. A dummy test coupling has been designed to check the accuracy of the Flowrator at least once each day.

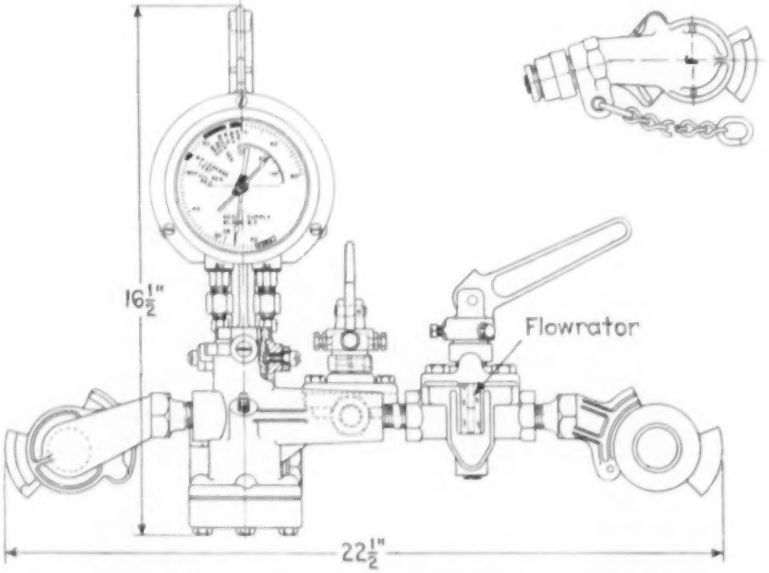
Original Flowrators provided a condemning line of 0.22 cfm. This meant that if the ball float reached the line, a leakage of as much as 4 psi per minute leakage could be expected from the average car brake pipe without any leakage from the AB valve or reservoir system. Since there is an unpredictable amount of leakage at hose couplings which is most serious in extreme cold weather, a margin to provide for this caused the condemning line to be moved.

Selection of a proper value for this could eliminate the need for the leakage test in the AAR code and leave the Flowrator determination of total system leakage as the only necessary one. Finally a con-



TRI-FLAT FLOWRATOR TUBE

Quanity of air flow is indicated by the height to which the float rises in the tapered flowrator tube.



Single car tester is slightly larger and heavier since redesigned to accommodate the Flowrator and the larger air guage.

demning limit of 0.14 cfm was chosen. If 70 percent of leakage is in the brake pipe and 30 percent in the remaining system (tests have shown this to be typical in either warm or cold weather), the maximum flow allowed with the new limit would mean 2 psi per minute in the brake pipe and 1 psi per minute in the remainder of the system. If all the leakage was in the brake pipe and none in the system beyond the charging ports, there would be no more than 3 psi per minute brake pipe leakage. This would leave 2 psi per minute leakage to be tolerated at coupling gaskets.

Using the Flowrator

The device must be calibrated each day by using the dummy test coupling and seeing that the float rises to the zone between the condemning line and the top of the tube. It is rugged and light in weight. Air passing through it should be as clean and dry as possible. Filters in the supply line and in the tester should be properly maintained. The tube and float must be cleaned with a suitable solvent.

When applying the test to a car, the device should be within 15 degrees of vertical when readings are made. Connect the end marked BP to the brake pipe hose at one end of the car—preferably the B end. Testing is done as follows:

1. Move handle to position 1 after making sure the Flowrator by-pass cock is open.
2. With both angle cocks open, note that there is a continuous blow of air from the open hose at the other end of the car, and then couple on a dummy coupling and charge the brake pipe and reservoirs to 70 psi.
3. After 10 minutes the Flowrator by-pass cock may be closed to determine if the system is sufficiently charged to get a flow reading.
4. If the float is not above the condemning line, open the by-pass cock and proceed to Test 1 in the Code.
5. If the float is above the condemning line, reopen the by-pass and continue to charge the brake system. After 15 minutes from start of charging again close the by-pass. If the float is still above the condemning line, make a complete check for leakage.
6. When leakage has been eliminated or reduced to keep the float below the condemning line, proceed with Test 1 in the Code.

What Has Flowrator Done?

A quicker, easier and more accurate check for brake system leakage has resulted from the new testing device. While most cars leave repair tracks with no more than 2 psi per minute brake pipe leakage, they almost always have other leakage not discovered by the present test. With the Flowrator there is a method of quickly evaluating this type of leakage. Use of the new Flowrator has been the subject of an AAR Letter Ballot and Mr. Alger reported that the device had been overwhelmingly approved.

R. J. Drewsbury, C&O, reported, during the discussion, that his road has used one of these devices for two years and that it has required no maintenance. It has been cleaned twice and retains its original accuracy which is checked daily as specified. The Canadian National, according to C. C. Maynard, has been trying one of these devices. When it has been moved from one shop to another, the men who have been using it have always been reluctant to give it up. There was some discussion about the conversion of the present single car testers. The changes can be made by the railroads—the tester does not have to be returned to the manufacturer. The larger gauge and Flowrator add 3 lb to the weight of the device.

Justifying Air Brake Equipment and Maintenance Costs

Balancing the ledger to determine if the increased cost of better maintenance and equipment can produce savings from improved performance is seldom easy. Air brake men find this especially difficult. Details and cost figures were forgotten as the Manhattan Air Brake Club presented the broad overall problems that confront Air Brake Association members.

Obviously there is a better operation and less trouble when more money is spent to improve the quality of equipment and maintenance. However the problem of attaching a dollar and cents value to decreased train delay, fewer injuries, less damage to lading and equipment, and better public relations is not easy.

Good maintenance must first come from the design of the air brake equipment. Grommet type compression fittings particularly at the angle cock were cited as a recent development that can be producing improved performance. Supervisors and maintenance men must know their jobs and must have the facilities and time to do them.

J. H. Russell, superintendent air brake equipment, NYC, summarizing the report said that economies to be realized with good maintenance of freight brakes can now be seen to appear in the following: (1) operation of longer trains during the winter; (2) reduction in terminal and yard delays; (3) reduction in costs for terminal and yard time; (4) reduction of delays enroute; (5) less delays to other trains; (6) reduction in personal injuries due to better air brake control; (7) reduction in damage to lading and equipment; (8) higher utilization cars and locomotives; (9) lower gross per diem charges; (10) reduction in derailments and other accidents; (11) reduction in the number of cars and locomotives to handle the same amount of traffic; and (12) savings in fuel costs.

The potential for obtaining increased traffic for the railroads is enhanced by good maintenance. This would be chiefly due to improved public relations brought about by: (1) improved safety in train operations; (2) on time delivery of shipments; (3) less damage to lading; (4) satisfied shippers being possible passengers; and (5) the psychological effect of good performance.

Slack Adjusters Discussed

During discussion F. W. Dell, supervisor of air brakes for the Grand Trunk, emphasized the importance of leaving slack adjusters for train yard adjustments, and adjusting piston travel in the dead and cylinder levers and the bottom rods when cars are on shop tracks. He subsequently said that he felt it would be worth-while for the ABA to recommend the mandatory installation of automatic slack adjusters to the AAR committee.

At the same time, T. H. Bickerstaff, general air brake supervisor for the Santa Fe, mentioned the drive to make changes in the provisions of Interchange Rules 100 and 101 mandatory, and asked that ABA members lend their support to this drive. It was brought out that the change in Rule 101 was approaching approval and that the principal delay was one of pricing agreement. This comes about because if a car is frequently on a repair track for other work, it would have its piston travel regulated far more frequently than necessary.

Pointed out was one car that was on 16 repair tracks in a single trip across the country. Had Rule 101 been mandatory, there would have been charges for 16 piston travel adjustments against the owner. Another speaker emphasized that the adjustments in piston travel should be made in the rigging and not in the slack adjusters on passenger cars and locomotives as well as freight equipment.

There was some discussion of the variations in designs of manual slack adjusters. The danger of having a man go under a car to make the brake adjustment was minimized by one speaker who said that when such work is being done, the train is under blue flag protection. Another speaker said that his equipment could be regulated from along side the car. It had been proposed that the ABA take action to urge further manual adjusters be built so that they can be adjusted alongside the car instead of under it.

Pressure Maintaining Speeds Trains

A few years ago the Rio Grande began trying to modify its original 24-RL locomotive brake equipment to achieve the same results obtained by enginemen on steam locomotives who used various methods of trick braking. All the schemes that had been developed attempted to make up the train line leakage and maintain the same reduction that had originally been made with the brake valve. Manufacturers have since designed the DS-24-M pressure maintaining brake valve to modify the 24-RL equipment and get results obtained previously only by skilled enginemen.

The D&RGW first considered its work with pressure maintaining a tool for braking on long mountain grades. It has since been used in districts with rolling profile where slack action is prevented by working power against a small but well maintained brake reduction. The Rio Grande continues to use retainers in some districts.

Savings of as much as two hours over the Pennsy's Pittsburgh Division between Pitcairn and Altoona have resulted from putting pressure maintaining valves on the road locomotives. The 11-mile East Slope which passes through the Horseshoe curve into Altoona previously required that a stop be made at the top for setting up retainers. Retainers are now turned to the fourth position by car inspectors on all but the last ten cars of the train before it starts over the Pittsburgh division.

According to a member from the Pennsylvania, the flat maintaining brake valve enables trains to come to a complete stop on the descending grades safely. Also, the retainers set up on the train permit a complete release and reapplication when necessary without making a complete stop.

Both Rio Grande and Pennsy were reported to regard the dynamic brake as essential for successful pressure maintaining operation on grades. Most of the holding is done with the train brakes, and variations in train speed caused by changes in grade or curvature are corrected with the dynamic.

The DS-24-M brake valve has proved popular with enginemen in all territories. For the first time the enginemen are said to really have complete control of train braking. It no longer varies with leakage. Successful pressure maintaining valve installations should place the equalizing reservoir close to the brake valve according to one member.

Roads that operate through districts which experience widely varying temperatures have the greatest difficulty with water in the air brake system, but during a discussion of the 1954 paper "Diesel Locomotive Compressed Air System," several roads reported improved performance when automatic drain valves are used. According to T. H. Bickerstaff, general air-brake supervisor, Santa Fe, the device is cheap and effective, but not a complete solution. The AT&SF is now putting these valves on all its locomotives. The Illinois Central is reported to have experienced difficulty with failures of components of the drain valves inside the reservoirs. These failures are difficult to find and removal of broken parts has not been easy.

The Erie has had satisfactory performance from its drain valve applications, according to P. D. Hawkins, general air brake inspector. Freezing was prevented, but at the same time the radiation surfaces on the locomotives were increased.

C. C. Maynard of the CNR said that road has increased radiation surfaces to eliminate water and oil from locomotive air brake systems. This has sometimes resulted in freezing on the locomotive rather than in the train line and has been a problem in itself. The CNR has enlarged the size of the piping in the aftercooler.

CNR locomotives assigned continuously to districts that have consistent sub-zero temperatures do not experience freeze-up troubles. Because most steam locomotives do not make long engine runs, they do not have the failures that befall diesels that start runs in mild temperatures and then run into very cold zones.

A discussion of a paper on high speed braking presented by H. J. Ainsworth in 1954 lead to a discussion of thermal cracking of diesel locomotive wheels. Mr. Ainsworth said that his paper had not been prepared for locomotives but was based only on coaches in high-speed service. He was not prepared to discuss locomotive wheels, but did read the following quotation from his paper: "Realizing that some of the brake and wheel troubles might be attributed to increased wheel loads as well as speeds, it has been proposed to limit the load that could be imposed upon wheels in faster service to 400 lb per in. of wheel diameter. If we specify a wheel load be restricted to 400 lb per in. of wheel diameter, the wheel load of 14,400 lb would be permitted for a wheel 36-in. in diameter. Such a wheel load is approximately the same as now found in conventional Pullman car service."

The Santa Fe has difficulty with road switcher wheels when these units are in high speed service. They develop thermal cracks according to Mr. Bickerstaff. The Pennsylvania has equipped passenger units with larger diameter wheels to eliminate thermal cracks according to one speaker. This was based on the experience of the Lackawanna where the same thing was done. It was developed that the DL&W also stopped using the locomotive brake and relied only on the train brake with these large-wheeled units. One member said that an ICC man had told him that they found more thermal cracks on 42-in. wheels and that the 40-in. wheels had been the best performers. Discussion of all the 1954 papers was conducted by C. H. Miller, ABA president.

Standardization Would Affect Angle Cocks, Bell, Horn and Train Signal

A committee report submitted by A. M. Malmgren, chairman, continued the work of making recommendations for standardization of diesel and turbo-electric locomotive brake systems. It has been proposed that there be an operating valve for fireman control of the bell ringer. It was also suggested that there be an extension of the horn rope to this location.

The use of standard angle cocks on the ends of these locomotives was recommended. This angle cock should be of the side vent type to exhaust air from the hose before hose parting. While the proposed angle cock should be located in the same position as that for a car, it could be backed up by a cut-out cock under the locomotive skirting to close off the train line in event of a collision.

Freight units average five to six right angle bends in the brake pipe between angle cocks, and the road switcher types average eight such bends. Mr. Malmgren stated that 90-degree bends are equivalent to 30-ft of the brake pipe and the presence of 31 bends between the ends of a four-unit locomotive are equal to 900-ft. of additional train line. The committee is interested in having locomotives with a minimum number of 90-deg. bends to reduce brake system charging time.

There was some discussion about the proposal that B units be equipped with air feed so that there would be more rapid response to air signal. It was felt by the committee that each unit should have an NS-1 reducing valve for this purpose. One proposal was that additional capacity should be provided from the A units by boring out the choke in the air signal feed. Doubt was expressed in the desirability of using the multiple NS-1 valves and attempting to give them all the same pressure setting.

The success of the filter element in the brake pipe between the brake pipe cutout cock and the distributing valve in the D-24 and AB valves led the committee to recommend that a filter of the D-24 type be made standard for the 6BL and 6SL equipments. This element assists in preventing oil from the compressor, pipe rust and scale, dirt, and water from sticking the distributing valve piston rings in the equalizing portion. The element would be required to pass the same tests and inspections given to it in the D-24 equipment.

Carmen's Responsibilities Continue to Grow

R. Schey
President

F. H. Stremmel
Sec.-Treas.

Defective cars cause about $6,000,000 annual damage due to loss and damage directly traceable to that source and much more than that amount because of factors such as rough riding, unfit draft gears and interior fastenings. These figures—presented by C. A. Naffziger, director of the AAR Freight Loss and Damage Section—show but one of the many categories of problems that groups like the CDOA can solve through the interchange of thinking that occurs in the preparation of its reports and during discussions at its meetings.

In addition to the reports and addresses covered in these pages, there were reports on loading rules, car-painting, and freight-car construction.

That the problems requiring solution will grow was the subject of President Schey's address which opened the three-day session.

On this subject he said, "Car department men today have more and more responsibility with the various types of special equipment, and since our last meeting, we have a number of new types of equipment to contend with. Piggyback is here to stay, and on most railroads not only the design and maintenance of equipment, but also the tying down is our responsibility.

Mechanically equipped refrigerator cars are also showing a considerable increase in ownership, and again, the car department must inspect and service this equipment. Many other special types of equipment are being installed to hold or bring back business to the railroads. We refer to specially equipped gondola cars for steel loading to eliminate blocking and shrouding costs, which gives us an advantage over the trucker.

In addition, we have special equipment for the automotive industry, also box cars with loading devices loading and holding down loss and damage claims. Many more types of equipment will be in service in the years to come, and the design and maintenance of this equipment is the responsibility of the car department.

Become Better Informed

President F. S. Hales of the Nickel Plate outlined two broad approaches to helping railroads get more business. First, he said the rail carriers can attract new customers and win back former customers "by trying harder to meet specific requirements of shippers."

Mr. Hales also called attention to the need for "all railroad people" to become better acquainted with the report issued last April by President Eisenhower's cabinet committee on transportation.

This report found, Mr. Hales declared, that present government policies on transportation "prevent the most economical use of the transportation plant, with the result that shippers and ultimately the consuming public bear unnecessary costs.

Legislation has been introduced in Congress to put into effect the basic recommendations of the cabinet report, Mr. Hales continued.

"I cannot urge you too strongly to become well informed on provisions of the report and the legislation supporting it," he said.

"Your ability to discuss this matter intelligently with customers and friends will be very helpful in freeing the railroads from the straight-jacket which has prevented them from competing on equal terms for more than a score of years," he declared.

Lubrication Group Studies Hot Box

The present method of testing various lubricating devices appears to be too slow. Testing technique should be improved so that devices could be proved or disapproved quickly in the laboratory. This would eliminate impractical devices quickly and narrow the field so that some positive results could be obtained quickly. The number of devices being tested makes it difficult for the forces in the field. Instructions formulated in connection with lubrication devices should be made available soon and this will eliminate much confusion and clarify many questions for the forces in the field.

Signal departments on various roads are complaining of an excessive accumulation of oil on rails, causing trouble with signal operation. It is not clear whether the loss

of oil is from journal boxes or from diesel locomotives.

In the search for some other method of lubricating car journals, the waste-packed box should not be neglected. It will be here for some time and is an immediate problem that must be dealt with.

Therefore, waste specifications should be re-examined and improved and reclamation processes improved to insure good quality reclaimed waste. Study should be continued to develop supplemental cooling medium, such as ventilation of journal bearings and journal boxes. A journal lubricant which will function efficiently at all temperatures should be found. In the modern era of scientific development it does not seem unreasonable to expect such a suitable lubricant to be developed and made available quickly.

The repack period on waste packed boxes should be extended to 24 months and eventually to 36 months. If sufficient data is not now available to justify this extension it is recommended that it be accumulated.

There has been a substantial improvement in hot box mileage during the period from November through April but only modest improvement for May-October. A 78 per cent improvement occurred in the period November 1953 through April 1954 compared with a similar period 1950 and 1951. The same data indicated only a 25 per cent improvement in performance for May-October 1954 as compared with a similar period in 1951. This information suggests that the lubricating problem for May-October has not been adequately met. While there may be some dispute with mileage data, the evidence appears conclusive.

Rip track forces can make a substantial contribution to hot box control. In addition to Rule 66 requirements, they should make a careful inspection of wheels, truck bolsters, truck sides, side bearing clearances, journal boxes and center plates. Hot boxes have been caused by defective truck conditions even though journal boxes and contained parts are properly maintained and serviced.

Open top loads should be carefully inspected on repair tracks and train yards to be sure there is no unequal distribution of lading, which is another cause of hot boxes which have been caused by unequal distribution of lading.

While compliance with Rule 66 is general and uniform, there is a radical difference in the servicing of journal boxes between different yards prior to departure. Performance records studied show a positive relationship between the quality of service and road performance. Data available to substantiate this suggests that the present waste packed boxes if properly serviced can give a good performance.

The primary reason for the radical difference in journal box servicing is the lack of mandatory rules. It was therefore recommended that Sec. 9 and 10 of the Lubrication Manual be made mandatory and paragraph "B" of Sec. 10 be modified to read as follows:

Outbound Inspection: At originating terminals and classification terminals all journal boxes of cars scheduled for line movement must be serviced in accordance with mandatory practice outlined in Sec. 9.

While hot box set outs in road trains represents a major percentage of all on line delays, there is still inadequate supervision in transportation yards to supervise and organize mechanical department obligations. Mechanical supervision in yards should be on an equal basis with operating supervision.

Consideration should also be given to an adequate oil supply, such as pipe lines to servicing areas, pressurized oil tanks on mobile equipment to eliminate the use of oil cans, improved tools for opening and closing journal box lids and making up trains on specific tracks to reduce servicing time. In short, the entire operation should be brought up to date. The situation now is something like trying to compete against a modern jet aeroplane with a 1920 automobile.

Suggestions made in the past for operating officers to participate in discussions and meetings on the lubricating problem are still considered practical because of the related interest of the mechanical and operating departments in expeditious train handling.

Appointment of a special sub-committee was recommended to work under the jurisdiction of the appropriate AAR Committee to study improved techniques of transportation inspection service, and this sub-committee should include a representative from the operating division.

The committee felt somewhat discouraged to note that well thought out recommendations of its predecessors had not been acted upon. If reports such as this were to have any significance, its recommendations must be processed through to some definite conclusion. It was suggested that a subsequent committee be assigned to review reports submitted by the lubricating committees from 1950 to 1955 and reports on action taken on the recommendations in such reports.

Chairman of the lubrication committee which prepared this report was W. J. O'Brien, general car foreman of the Nickel Plate.

Lubricator Discussion

In the discussion of the Car Lubrication report at the CDOA meeting the members expressed the definite opinions that lubricating devices using lubricating pads are the best hope for solving the hot box problem.

J. F. McMullen, superintendent, car department, Erie, set the general theme of the discussion when he said that if waste-packed boxes are with us for a long time to come then hot boxes will be with us just as long. He mentioned the large number of Erie cars on order and said that all of them would have lubricating devices with pads.

C. T. Hunt, assistant engineer tests, Pennsylvania, said that they had more hot boxes on their hopper cars than any other type. Of 30,000 hopper cars the Pennsylvania has installed lubricators on 6,000 cars. These latter have shown a five to one performance improvement over the cars without lubricators.

The member from the Kansas City Southern cited his war experience when 20,411 military railway cars built for European operation with waste-packed journal boxes had about a hot box per car in an eight-month period and the same type of cars with European lubricators under the same conditions had none.

J. R. Jennings, general manager, Wilson Car Lines said that the 63 cars with lubricators in service last year had 9 hot boxes but in most cases the hot box was due to mishandling of the lubricators because of a lack of knowledge by the servicing forces. In 1955 there has been a substantial improvement with only three hot boxes while the hot boxes in waste-packed boxes has increased.

President Schey of the CDOA summed up by telling the members to return home and sell their respective members on the installation of substantial numbers of lubricators, making a selection from the several types now available.

Fundamentals of Mechanical Refrigeration

The power plant for the majority of mechanical refrigerator cars consists of a diesel engine coupled directly to the alternator (a-c generator). Instead of the spark plugs found in the gasoline engine to ignite the fuel, the diesel depends on raising the temperature of the air in the cylinders to the point where it ignites the fuel. This requires a high compression ratio, particularly in starting. For this reason, some engines use auxiliary starting aids such as manifold heaters, glow plugs and ether starting aids which allow the engine to be designed with a lower compression ratio and hence lighter.

The glow plug is nothing more or less than a wire which becomes red hot when electric current passes through it. This helps to ignite the fuel that is sprayed at high pressure by the injector nozzle. After the

engine has run a few seconds enough heat is retained in the engine to sustain operation. The manifold heater is a similar device which heats the intake air for combustion and aids starting. The ether capsule (which should be released only after the cranking of the engine begins) lowers the ignition point to aid cold weather starting.

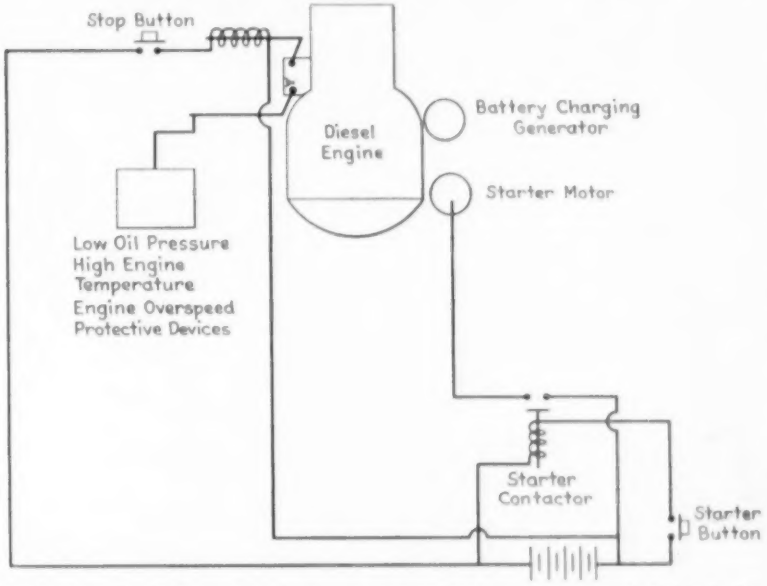
There are four major items of servicing that a diesel engine requires:

1. It should never be allowed to run out of fuel because the injector parts are precision parts that depend on the fuel for lubrication.
2. Clean fuel is of the utmost importance since small particles of dirt can stop an otherwise good engine.
3. The radiator must be kept clean and the water level carefully maintained.
4. The engine oil must be maintained at the correct level and be checked for dilution from fuel oil and other contaminants such as water and sludge.

There are three major ways to cool the inside of the car. In the cold plate car, large flat brine tanks attached to the roof of the car contain the evaporator coils of the freon system and frozen brine. Heat transfer from the load is by convection currents of the air within the body of the car. In the event of a power failure the frozen brine keeps the car cold for a period of time in the same manner as the old ice box.

The "envelope" car has a false ceiling, floor and walls through which is circulated air from the evaporator coils. The cooling air is never directly in contact with the lading.

The modified envelope car and the open circulating air cooled cars are much the same. The air circulating through the car passes over the load and cools it. The modified envelope car has the false ceiling perforated in order to allow cold air to pass over the load while the return air to the evaporator is drawn from beneath the floor racks to the evaporator. A very similar air circulation system is used in the the open car with the exception that the discharge air from the evaporator is forced directly over the lading.



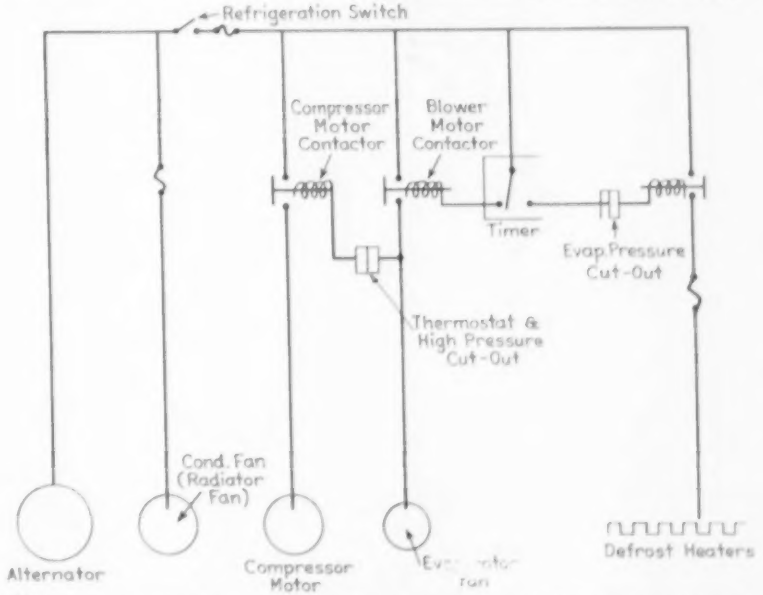
Pushing the "start" button closes the starter contactor, feeding current from the battery to the starter motor to turn the diesel engine over. The protective devices at the left automatically shut down the engine for the causes shown.

There are three basic types of refrigeration systems. The diesel engine generator plant powering an electric motor driven refrigerator system, the Thermo-King gasoline or semi-diesel engine which operates the refrigeration plant by direct connections and V-belts and the cold plate car with Fairbanks-Morse engine driving the refrigeration system by V-belts. The most noticeable difference in these systems is that the diesel engine-generator runs at all times with the refrigeration equipment cycling off and on to control the car temperature. The Thermo-King engine shuts down completely when temperatures are satisfied, and the compressor unloads on the cold plate car.

The refrigeration system is now complete with air circulation or "cold" transfer medium. It should work indefinitely except that moisture collected by this circulated air is deposited on the evaporator coils. This frosting on the coils acts as an insulation and reduces their efficiency in removing heat from the load. An indication of this occurs when the freon return line to the compressor frosts over.

A defrosting system melts this ice from the coils. In some diesel-electric systems this is done by electric heating elements. Other types by-pass the hot freon gases from the compressor around the condenser and to the evaporator to melt the ice off the coils.

De-frosting may be initiated in several ways. In some cases a pressure differential switch actually measures the amount of ice by detecting the restriction to air flow over the evaporator coils. Defrosting begins when the restriction exceeds a given



Schematic arrangement of the electrical circuits in a diesel-electric refrigerator-car refrigeration system. The timer, blower-motor contactor and compressor-motor contactor allow the diesel engine to come up to full rpm before being loaded.

HOW THE REFRIGERATION SYSTEM IS WIRED AND WHY

The radiator fan motor is directly connected across the 220-volt line from the alternator which supplies the power for the system which means that as soon as the diesel engine starts the radiator fan motor starts. Since this starting load is small the engine can handle it satisfactorily. However, the engine cannot handle heavy starting loads. Therefore, there are time delay relays and sequence relays that allow the engine generator to come up to full rpm before allowing the evaporator fan and later the compressor to start. This avoids excessive initial loads and protects the electrical equipment. Also seen on this diagram are the defrost heaters which have their own control circuits. The various control circuits on this equipment may be either a-c or d-c voltage.

***Note:* Another section of this report explained the fundamentals of a mechanical refrigeration system, with appropriate diagram.**

amount. Temperature of the evaporator coils starts it in other cases. In other installations the defrost is set on a time basis only—the defrost timer starts the cycle periodically holding the system in the defrost cycle until the evaporator temperature rises to a pre-determined setting.

When the car is in defrost, the compressor is shut down or the condenser coil is by-passed and the evaporator fan is stopped. Drain pipes carry off this moisture and they are heated in most cars so that their moisture will **not freeze.**

When the mechanical refrigerator car is once loaded with merchandise and billed to destination it is up to the railroads over which the car travels to give proper attention to the car so that it arrives at its destination without failure or damage to the lading. This may be the responsibility of any number of persons representing various departments in the railroad organization. The contract carriers also have their service and maintenance organizations. However, it should be the immediate responsibility of the car department through the train yard car inspector to report to the maintenance forces when a mechanical refrigerator car is not maintaining proper temperature. Refrigerator car maintenance personnel cannot be expected to check each train for mechanical reefers.

The car inspector cannot take time to do any more than check the car temperature and record it in his notebook along with the car number. This can be easily done and will prevent much difficulty. If a malfunction is found and reported, it then becomes the responsibility of the maintenance forces to locate and correct the trouble.

To tell the car inspector what temperature the load is supposed to carry, a card should be provided at the temperature gauge which will state the temperature setting. In this way the car inspector or the refrigerator car inspector will know at first glance if trouble is to be expected. Refrigerator car inspection personnel as a rule make the en route inspections and record the necessary information in the log book which is carried on each mechanical refrigerator car. But these men are not located at each point of train inspection and interchange. Therefore the train yard inspector should make needed observation and notation for proper control and necessary maintenance.

The log book on the car states who is to be notified in case of trouble and particulars as to proper fuel, lube oil, etc., to be used on the equipment. Through these log books the owners or operators can follow car performance and make necessary corrections at maintenance periods.

There are two general ways to schedule periodic inspections. The first is on the basis of hours of operation of the equipment (1,000-hr inspection, 5,000-hr inspection, etc.). This inspection relates inspection and maintenance needs closely to actual usage. It is usually used by contract carriers.

The second method is based on straight time. This method tells (2-month, 6-month and annual inspections) from day to day when each car is due for inspection and the cars can be called in for maintenance as required.

TEMPERATURE AT WHICH FREON-12 BOILS AT REPRESENTATIVE PRESSURES

Pressure, psi	Temperature, deg F
180	130
100	90
52	55
21	20
12	5
9.2	0
4.5	—10
0.5	—20
5.5 (Vacuum)	—30
11.0 (Vacuum)	—40

The en route inspection is strictly a matter of the individual railroad's policy. However, the committee felt that such inspections should be made at least once every 18 hours to protect the load and provide the necessary safety factor to allow time for repairs to be completed.

The interchange inspection should be made immediately before a car is released from one railroad to another. This protects the railroad which has had the car and probably initiated the shipment. It also serves to protect the customer since such transfers could otherwise lengthen the period between inspections to the point where a failure even though minor, would damage the load.

The committee also listed designations for various valves, switches, thermostats, contactors and relays used in four makes of mechanical refrigeration, which showed that few are the same. It, therefore, recommended that manufacturers of equipment standardize on symbol designation of the component parts as has been done in the diesel locomotive field through cooperation between the builders and the AAR. The report also included detailed trouble-shooting lists for the major components of the refrigeration system, each giving the cause, the symptom and the cure for most troubles that may occur. —Editor

This report was prepared by a committee of which M. B. Adams of the Santa Fe was chairman.

Wheel-Shop Practices

Recommendations by the committee on wheel shop practices included:

Revising Rule 355 (p) to make magnetic particle testing of pulley drive axles mandatory when wheels are processed through the wheel shop for restoration of tread and flange contour. The committee also recommended addition of a new Rule 355 (Q) to require magnetic particle testing of axles equipped with Spicer drives at wheel renewal.

The committee also recommended the use in freight service (as substitutes for one-wear wheels) of passanger car wheels which have been worn and turned down from a nominal 36-in. diameter to a nominal 33-in. diameter. The Milwaukee Road uses such turned-down passenger wheels which are nominally 33 in. after turning down on 5 by 9, 5½ by 10 and 6 by 11 freight axles. They adhere to compliance with Rule 98 of the interchange rules and the maximum wheel seat diameter is not exceeded by more than ⅛ in.

It is the committee's opinion that these turned-down wheels which have 6 by 11 seat and 7 15/16-in. bore can be economically utilized by adopting a 5½ by 10 freight

axle with forged center and a 6 by 11 wheel seat diameter. This 6 by 11 wheel seat diameter on a 5½ by 10 axle would be similar to that now utilized on 5½ by 10 passenger axle.

To permit realization of this economy, which has no apparent disadvantages, a change in Rule 98 was recommended to permit a full charge for a freight car axle with a forged center having all dimensional characteristics of a 5½ by 10 axle with the exception that the wheel seat be that of a 6 by 11 axle.

The Committee recommended, in view of the difference in radius on the back flange, that one gage be used for cast iron and one-wear wheels, and another for multiple-wear wheels, and that more dimensions be detailed in the drawings of the mounting gage in Fig. 117.

Par. 356-B should be changed to read that if a separate dial gage is used in wheel mounting the one on the recorder may be blanked out to eliminate any misunderstanding.

The Rule 355 (0) requiring that overheated journals be stencilled was recommended for change to call for steel stamps not less than ¼ in. high on the end or ends of the axle.

Rule 356 (B) should call for the testing of gages by means of dead weight tester only, and that the accurate master gage alternate be eliminated as there is no master gage in the true sense of the word.

Another recommendation called for extending to wheel shop practice the specifications for new axles in regards to seams (Manual of Standard and Recommended Practice, Sec. "A," Specification M-101-54).

This committee recommended that Par. 356 (i-3), (i-5), (1-7), (1-8), (1-9) and (1-10), Page 213, should be eliminated, and new Par. 356 (1-3) be added to read —"no double plate cast iron wheels, and no single plate non-bracketed design cast iron wheels (excluding the 650 lb size) can be mounted and are prohibited on all cars in interchange."

Where the new gage for wheel seat location in Supplement 2, Page 20, Exhibit "D" is used, Par. 355-E, Page 209, should read—"a taper of 1/32 in. diameter extending a maximum of ¼ in inward from dust guard seat must be turned in wheel on 7 in., 8 in., 9 in. and 10 in. journals and extending a maximum of ½ in. inward from dust guard must be turned in the wheel seat on 11 in. and 12 in. journals to insure true entry into the wheel and to prevent tearing and gouging during mounting." Also, dimension (C) in supplement distance from end of axle to taper should be (A).

The committee recommended specifying the limit of eccentricity on journals used with roller bearings to prevent re-mounting second hand axles with eccentric journals which would contribute to journal or roller bearing failures in service, as the wheel seats are only machined on roller bearing axles.

To eliminate any misunderstanding or misinterpretation in the wording, Par. 140, on 7 in., 8 in., 9 in. and 10 in. journals and 354-H, the committee recommended a change in the wording to read as follows:

"If bore in wheel must be increased more than ½ in. in diameter, then two roughing cuts must be taken."

Chairman of the Wheel Shop Committee was E. M. Spencer, wheel shop foreman on the Illinois Central.

How To Make Passenger Cars Ride Better

The most common maintenance faults leading to passenger discomfort involve wheel contour wear—double flanges, worn tread, and loss of proper service contour. Many railroads set mileage limits of permissible wear for wheel treads on certain types of trucks and cars. This extends the life of pedestal liners and box liners since the lateral disturbances are kept to a minimum.

Other roads set up limits of wear for the wheel treads and find this easier than constantly checking for mileage or time. The present developments and installations for re-contouring wheel treads without removal of the wheels from the trucks are becoming more and more the planning for the future. They will be instrumental in reducing car out of service time and keep cars in better riding condition.

The worn wheel tread condition is not the sole cause for lateral disturbances. A close check must also be made of truck clearances. These become more exaggerated as mileage builds up after the last complete truck overhaul. Permissible tolerances must be set up for pedestal liner wear and journal box liner wear which result in undesired lateral motion to the truck. These must be adhered to closely to have the truck as a unit respond to the track variations, as designed, and produce a good ride. Equalizer interference, also of major concern can be attributed in most cases to excessive clearances around the journal box and pedestal.

Truck responses are greatly affected by bolster and center plate motion with the former being greatly regulated by stabilizers and shock absorbers. Many types of controlling devices have been designed and installed to regulate the motion of the bolster and each must be checked carefully to be sure that the specified control is obtained. Center plate clearances and lubrication must be followed closely to see that body disturbances of both high and low frequency are not developed there.

Truck alignment is very important. The truck must stand at a uniform height from the track and have uniform clearances to allow it to operate at a uniform parallel distance with the track. Any variation that will prevent the truck from tracking properly will set up a very undesirable car body action. Main causes of misalignment are defective or improper springs, or improper vertical shimming to allow for variation of wheel diameters.

The proper tracking reaction of the modern truck is very critically controlled by the spring design and the various loads as calculated for both the bolster and equalizer springs. Most new designs are coil springs which require careful inspection and checking. The inspections must include such items as broken sections, wire working solid and interference between coils. At specified periods all springs should be tested in a test machine to see that each group carries its correct portion of the designed load.

The high frequency disturbances of a passenger carrying car are those referred to as noise or vibrations produced by defective auxiliary equipment. Many erroneous reports marked a car as bad riding, whereas the report should have stated undesirable noise or high frequency vibration. As such inaccurate reports are usually made by an employee unfamiliar with car maintenance problems, he should be quizzed further to get more precise data.

Instrumentation should be used to determine and index the riding performance of a passenger car. One way is to use a ride recorder and get a tape record of car performance (lateral and vertical) over track of known characteristics and consider this as the measuring stick of good road bed condition.

To determine the lateral index of the car a tape is ruled with lines. Motion is referred to as a disturbance of so many lines, with one pendulum for both right and left motion. Thus, a lateral acceleration that causes a deflection of 4 lines produces about twice the discomfort as that which causes a 2 line movement.

A similar scheme is used for rating vertical vibrations. Total numerical sums are then compared to tables and the car rated anywhere from very good to very poor, depending on the limits between which the sums fall vertical and lateral.

Experience has shown that indexing of these recording tapes requires some degree of judgment. For true lateral valuation, the work should be done on tangent track and the operator should make notes on the tape where car reaction is not as bad as the tape would indicate. It has also been found that the recording of the vertical vibrations is less accurate than the lateral and it may be desirable to reclassify the ride according to the judgment of the operator at the time of the test.

This is a report by a committee of which W. E. Symons, assistant general mechanical superintendent, New Haven, was chairman.

How To Be an Executive

"The mechanical officer is a versatile man, a sort of combined mechanical engineer, scientist, production expert and personnel manager—but we seldom find him in high executive positions," said W. M. Keller, executive vice-chairman and director of research, Mechanical Division, AAR, at a luncheon on Tuesday, September 13.

Selection of higher officers is on a fair and scientific basis within and outside the mechanical department. Yet, "as I have stressed, few mechanical men are in higher

W. M. KELLER

management positions. Therefore, we must agree that the reason must be within our own ranks. It is no serious reflection on one's ambitions to desire to avoid the crushing load carried by the modern executive. One has to be dedicated to the task to endure the constant drain on personal energy and the sacrifice of time which might otherwise be devoted to personal hobbies or pleasure.

"I do not believe we have in the past put enough emphasis on formal education. This does not mean that we are an uneducated group, but simply that any theoretical knowledge required for our jobs should be acquired before we encounter the task and not after. Education is now almost universally available in this country and with correspondence courses, night courses and Saturday classes available deficiencies in this regard can be readily, though not easily, corrected. Of course, we must study each new assignment and learn more as we grow with the job.

"We have a tendency to be provincialistic and overlook the importance of knowing what goes on in other departments. No one can have a complete working knowledge of maintenance of way, traffic, accounting, purchasing, etc., but we should have a constructive interest in the work of these departments. One can then understand better the correlation of the different departments and this helps us do a better job. We can learn about outside operations without being 'busy bodies' and raising questions as to the handling of the work of other departments. Our first task is to thoroughly understand our own department, then having secured this knowledge learn something of other departments."

Learn more about your railroad—how many locomotives, freight cars and passenger cars it operates and owns, Mr. Keller advised. Find out the number of freight car miles your company operates per year. How many miles of track does your railroad have? What is the expenditure relationship between engineering and mechanical departments? These figures are readily available from the trade magazines, governmental bureaus and the AAR.

"Study better means of expression and relationship in reporting to superior officers. It is understandable that we have a tendency to be nervous in reporting to superior officers, and this may merely show proper deference. It can, however, show lack of preparation in our work, which is a condition that must not exist.

No one who has had time to study an assignment should expect anything better than a bad time if he is unprepared when he reports to his superior. Weed out unnecessary or irrelevant statements in reports. Don't turn in the first draft of a report. Complete your report as soon as possible, and then read it objectively later and revise all parts that are not clear. After you read your statement on the typewritten page remember it is not like the holy writ. Rewrite as often as clarity requires. Remember, too, your superior officer is a busy man.

"Accept criticism cheerfully. Adverse criticism is usually made to be helpful. If, as an exception to the rule, it is based on a personality conflict, remember that hostility and bristling will not improve a bad situation. You have heard the expression that a person is too close to the trees to see the forest, but conversely a quick look at a forest may not reveal the trees. Try to find out what details in the trees would change the forest to desired proportions. Above all don't back away from a statement that is a fact. Your boss may question a statement to smoke out the details that your language left undisclosed. Don't worry about language if your superior decides to change it as long as the facts are left unimpaired. Be sure of the facts and then stand by them. There are dozens of ways to describe a situation in words. Which one is used is unimportant, but quality of workmanship is not served by withdrawing from a correct statement of fact.

"If you have plainly indicated the situation and recommend a certain course of action, cheerfully accept a different course than you have recommended. The boss may have policy reasons of which you are unaware for changing your recommendations, and he may not take time to explain them to you. There is a little statement printed for 'under the glass' desk use which says—'The Boss may not always be right, but he is always the Boss,' and I think that describes a condition we occasionally forget.

"Please remember that in my remarks I am not suggesting that mechanical officers have grounds for complaint. We will move into the executive level as soon as we demonstrate we are capable of handling the assignments involved. A few mechanical people have gone to the top. There is no prejudice on the part of management against mechanical people moving out of mechanical departments. If we are to move out in greater force, I believe we need counseling. My counsel to you is to give serious thought and consideration to this situation if you are ambitious for higher management positions. The future is alive with possibilities, so start now and success will be yours."

Record Attendance at LMOA Sessions

Eight reports on mechanical, electrical and boiler subjects plus two addresses hold maintenance mens' interest

F. D. Sineath
President

C. M. Lipscomb,
Sec.,-Treas.

Once again, well over 800 members and guests registered for the annual meeting of the Locomotive Maintenance Officers' Association in the Grand Ballroom of the Hotel Sherman which this year included a group from the former Master Boiler Makers' Association. Of the five sessions (Tuesday afternoon being set aside for members of all associations to view the exhibits of the Allied Railway Supply Association) four were given over to the mechanical and electrical reports and the fifth session to two technical reports prepared by a committee of the Boiler Makers' group.

The mechanical reports had to do with the Overhaul of Power Assemblies and Bearings; Reclamation of Diesel Parts; Shop Planning for Maximum Use of Existing Facilities and Axle, Wheel and Truck Maintenance. The Shop Planning report appeared in the October *Railway Locomotives and Cars;* the parts reclamation report elsewhere in this issue and the remaining two mechanical reports will be dealt with in detail in other issues.

Of the two electrical reports, one which dealt with "A Positive Electrical Diesel Maintenance Program" was published in the October issue, page 62. The other was on the subject of the "Control of Electrical Delays and Ground Relays."

The association's annual meeting this year was favored with two addresses, one by the Hon. Owen Clarke, ICC Commissioner, who spoke on the relation of maintenance problems to safety of operation, and another by A. K. Galloway, retired general superintendent motive power and equipment, Baltimore & Ohio and a member of the LMOA Advisory Board. Both of these addresses appear, in abstract form, in these pages.

The officers, members of the executive committee and members of the Advisory Board for the year 1955-1956 appear, with those of the associations, on page 66.

Conditioning Package Boilers and Steam Generators

Extensive dieselization is in the process of making what we know as the stationary power plant at various terminals an obsolete piece of equipment. These plants are becoming outmoded because they are laborwise uneconomical, expensive to maintain, fuel costs are high and generally much too large for the lowered steam demand and oil and gas eliminate costly coal and ash handling.

New buildings with modern radiation, smaller buildings to house the motive power due to greater availability of the diesel power, elimination of boiler washing plants with necessary pumps and less locomotive washing accounts in part for the lowered steam demand and consumption.

The railroads are now following the trend of industrial establishments and manufacturing plants in demanding and purchasing completely packaged steam generating units. The steam generators are manufactured as complete units and they include all controls and safety devices. Engineering costs are negligible and the installation costs are low as it is only necessary to connect to fuel, steam, electric and water lines and to a stack outlet.

Since all mechanical equipment will cause trouble and create difficulties when not properly handled, the package boiler is no exception. Adequate supervision is necessary even though they are designed to be automatic or semi-automatic. Adequate service facilities, proper feedwater treatment with a deaerating heater, fuel oil additives, steam treatment for return line corrosion prevention and preventive maintenance must be given serious consideration.

The common characteristic of all types of package boilers is their ability to produce large amounts of steam within comparatively small dimensions. They also contain a relatively small amount of water in relation to that which is evaporated each hour of operation. For this reason the heat transfer surfaces in both the water and fire side must be kept absolutely clean and be free from scale and soot.

The package type boilers usually fall into two classes: the modified Scotch type

with firetubes and the water tube type with one or more drums. The Scotch type with multiple passes range in size from 15 to 600 hp and may be equipped with or without a wet back. The smaller sizes have a plain combustion chamber, the larger sizes have a corrugated furnace to give freedom for expansion while still maintaining the necessary rigidity. Proper baffling conducts the hot gases through the design gas passages.

The water tube steam generators are of a later design, are made in about the same capacities as the fire tube type, but can be manufactured for higher pressure. This feature is of doubtful value for shop steam. Many different types are available from a simple two drum to the more complicated types with multiple drums and water wall headers. The boiler is contained in an insulated steel jacket and may be installed either indoors or outdoors. The large number of bare water wall tubes is responsible for the efficient furnace wall cooling and absorption of the radiant heat.

When contemplating the installation of a package boiler an exhaustive study should be made of the water requirements and the type of treatment. Basically the mechanism of scale formation in both the fire tube and water tube types is fundamentally identical. Silicate scale, sulfate scale and carbonate scale impede heat transfer in the mentioned order. They must not be present and when once formed and deposited, they are very difficult to remove from either the small tubes or flues and the corrugated furnace of the firetube boiler.

(*Continued on page 59*)

Changed Practices Can't Reduce Safety

Owen F. Clarke

Responsible railroad officers have a "definite obligation" to make certain that new practices adopted for operating economies do not adversely affect the safety of the traveling public and railroad operating personnel.

This view, expressed by ICC Commissioner Owen Clarke, highlighted an address before the LMOA.

"Regulation should never hamper improvements in transportation that will increase efficiency and advance the public interest," the commissioner said.

"However," he added, "the desire to progress is not a license to cut corners of safety."

Mr. Clarke said the ICC is not ultraconservative, but its responsibilities "are too great to permit us to acquiesce in, or condone, the use of equipment that would reduce the degree of safety now afforded."

The ICC's Duty

"It is our duty to see that operating changes do not result in neglect of necessary inspections and tests; that no locomotive or unit is dispatched which has not been properly tested and in a safe and suitable condition for service," the commissioner said.

"Locomotive safety, we believe, should receive the same serious thought and attention that anticipated cost reductions receive when operating changes are contemplated."

"This is particularly true," the commissioner went on, "with respect to casualties caused by falls in and about diesel units. Some railroads have made progress on this kind of "poor housekeeping," he said, but he asked that LMOA members continue to give the subject careful attention.

Turning to the ICC's rules for locomotive inspection, Mr. Clarke said rules for inspecting and testing locomotives "other than steam" are now being reviewed by the commission.

"It is not anticipated," he said, "that any of the proposed changes will impose additional burdens upon the mechanical forces."

Discussing locomotive safety programs, the commissioner said realistic evaluation of such programs "ought to be on the basis of accidents prevented, rather than on accidents reported."

Commissioner Clarke commented, also, on the ICC's streamlining work of the past two years. One result has been the consolidation of the former separate bureaus of Locomotive Inspection, Safety and Car Service.

"I am happy to report that through our new bureau, the business of the railroads with the commission in those fields has been substantially expedited," he said.

"We are hopeful," he added, "that still other advantages will flow from this consolidation which will be beneficial to the public, the railroads and the ICC."

A Look At Safety

Commissioner Clarke told LMOA members that a "definite relationship" exists between locomotive safety, performance and operating costs.

"Basically," he said, "a well-maintained locomotive is a safe locomotive, as well as economical and efficient to operate."

An effective preventive maintenance program can reduce the all-important repair and maintenance costs, he added.

"Frequently in accident investigations, we find a history of repeated reports covering the same defective condition," he continued. And, he said, the ultimate cost is often many times that which would have corrected the basic defects.

There are many methods of treating the feedwater supply and mode of treatment is dictated by the composition of the raw water supply and the amount of condensate return. To list a few of the choices:

External Treatment

1. Lime-soda-aluminate, hot or cold process.
2. Lime-soda-phosphate, hot process.
3. Lime-Zeolite.
4. Sodium Zeolite.
5. Sodium Zeolite—Dealkalization.
6. Demineralization.

Internal Treatment

1. Soda ash, caustic soda or alkaline salts.
2. Phosphates.
3. Various combinations of alkaline sodium salts with suitable types of organic compounds.

The boiler water must be maintained at zero hardness and it is therefore imperative that an aftertreatment be added to the boiler where external treatment is used. The post treatment should consist of phosphates and organics to remove the last traces of hardness and assist in fluidizing the small amount of residual sludge causing it to be non-adherent, also the organic should preferably be a type that will be an oxygen scavenger. Catalyzed sodium sulphite or hydrazine will also accomplish the same purpose. To assure a good quality steam with no foaming, the post treatment should include one of the new type antifoam chemicals. The post treatment should be added directly to the boiler drum, preferably at a constant rate or at intervals frequent enough to assure ample chemical is present at all times,

Continued on page 60

Galloway Charts Path

A. K. Galloway

A. K. Galloway, an Advisory Board member of LMOA, had praise of the past and advice for the future when he spoke before that organization.

"Members of the Locomotive Maintenance Officers' Association, with their combination of ideas, facts and figures, have been a motivating factor in the development of better diesel locomotives . . . this organization is invaluable to railroad supervisory personnel as well as to the railroads themselves," Mr. Galloway declared.

Mr. Galloway, retired general superintendent motive power, B&O, was presented an honorary life membership in LMOA.

Looking to the future Mr. Galloway said:

"The LMOA can play an extremely important part in assisting railroads achieve desired improvements, but I feel some change in policy would be required. . . .

"This can be brought about through more specific handling and detail on one individual problem, rather than the broad coverage given our general topics which have been handled in the past. General topics should not be dropped entirely . . . but more time must be given to detail and solution of individual problems. . . .

"I would encourage the formation of committees from individual railroads to meet for practical discussion at not less than 3-month periods. . . .

"Coordination of such committees through this organization would result in much more specific information from which railroads would derive an even greater benefit from many of the general topics as are being discussed at this convention.

"I feel that this organization should have the backing of every railroad on an official basis, and that membership in LMOA should be encouraged officially in every way possible."

Mr. Galloway went on to say he is not suggesting that LMOA needs reorganization, or that topics presently being handled are not being well covered and well presented.

"However," he added, "I am certain more detail handling of specific problems, being given a portion of committees' time, would be of considerably more benefit to the railroads."

Tracing the Past

Elsewhere in his remarks, Mr. Galloway traced the changed thinking that grew out of the transition from steam to diesel power.

"Old ideas, deep rooted in steam locomotive tradition have to be reviewed, re-evaluated and changed or completely discarded," he said.

New and converted locomotive shops were designed and equipped to provide the most economical and efficient means of repairing diesel locomotives with minimum loss of availability, he added. Many primary ideas about diesel shops had to be changed, but the final product has, in most cases, been shops which are adequate for diesel repairs.

As the power trend continued, tools and machinery for repairs presented another problem, Mr. Galloway continued. Every possible use was made of existing machines, and it was necessary to recondition older machines so they would operate at the closer tolerances required.

"Many new tools were developed and placed in service, and workers in the shops made many contributions," he said.

remembering the boiler water volume is small in comparison to the steam output. The chemical additive is only as effective as it is proportioned.

Internal treatment likewise requires proper proportioning equipment that will give satisfactory results and conserve chemicals. The chemicals should be fed directly into the boiler drum and added continuously. The tannin and processed lignin will peptize the precipitated calcium and magnesium salts and make them readily removable by the blowdown. Their effect is at times unpredictable as the dosage is affected by the composition of the raw water. Proper dosage for best results is determined by experiment.

Regardless of the type of water treatment used, blowdown is of serious import. With external treatment the reduction of dissolved solids is accomplished. With internal treatment the blowdown reduces the sludge concentration. The amount of blowdown is governed by load on the boiler and the permissible total solids content. A continuous blowdown results in more uniformity in the concentration of the solids and therefore a better quality steam. The hand blowoff cocks should also be used in conjunction to remove the sludge that settles in the locations where circulation is low and to keep them in operating condition. This is especially important with water wall headers.

Simple control tests of the treatment and blowdown should be made by the operator at least daily, then inspections and tests should be made at regular intervals by a trained water treatment chemist. This type of control program will assure trouble-free operation.

Condensed steam has a low pH, the acidity being due to dissolved carbon dioxide evolved from the boiler from decomposition of various salts. The gas is mixed with the steam and is carried to all parts of the system, there to disolve in the condensate and attack the return piping and appurtenances. The corrosion can be prevented by treating the steam with amine compounds. Neutralizing amines react with the carbon dioxide to form amine carbonate and in the process raise the pH to neutrality or above, depending upon the amount proportioned into the steam. The morpholine type is recommended where the return percentage is high, roughly 50 per cent or more. The morpholine return to the boiler with the condensate and distills out with steam to continue its neutralizing effect. Filming amines form a non-wettable monomolecular film over the surfaces of the steel to protect it from aggression by either carbon dioxide or oxygen. It is necessary to feed filming amines into the saturated steam main continuously because the thin film erodes from metal. It should not be fed into the boiler or into superheated steam mains. The control for both of these compounds is accomplished by observing test nipples installed in various points of the return piping.

Fuel oil combustion additives are very desirable to prevent soot formation on the tubes and more especially at the inaccessible places where the soot blowers are not effective. These compounds lower the ignition temperature of the carbon deposits causing them to burn off rather than accumulate. Soot deposits attract moisture when the boilers are idle. The sulfur from the burned fuel along with the moisture will cause serious corrosion on the fireside. It is necessary that the fireside be kept clean as the higher the sulfur content of the fuel and the greater the humidity, the more severe the corrosion. Severe fireside corrosion which can penetrate the tubes can also be caused by the formation of calcium, sodium or vanadium acid sulfates, these being products of combustion which, mixed with soot or carbon, form an adherent scale. These too are minimized by combustion additives.

Prevention of the deposits on the heat transfer surfaces of steam generators can only be accomplished by adequate supervision and testing by trained personnel. This detail is necessary in order to realize economical, reliable, trouble-free and efficient operation.

This report was submitted by the Boilermakers' Section Committee of which H. M. Schudlich, engineer water service, Northern Pacific, was chairman.

Fix, Have Fixed Or Buy New?

Management, aware of the high cost of diesel locomotive replacement parts and knowing that substantial savings can be effected by the proper reclamation or repair of used parts, is faced with the task of determining what parts can be repaired or reclaimed at a saving, and what parts should be redesigned for greater serviceability. This is the problem approached by the Diesel Material Reconditioning and Control Committee in a report entitled, "Repair and Reclamation of Diesel Parts in Railroad Shops."

Reclamation and repair work, the report states, should be divided into light and heavy classes. Light work can be handled with little equipment at minimum cost at any shop. Heavy repair and reclamation should be handled at centralized railroad shops or by outside concerns as they require equipment, procedures and techniques not found in small shops.

Selection of a heavy work site must consider availability of needed machinery and skilled workers, a central lication and the maintaining of minimum stock.

For light repairs it is essential that the assignment of this work be accompanied by the proper instructions on what to do and how to do it.

Selection of those parts to be reclaimed necessitates comparing the cost and service life of a restored part with that of a new part. Test set ups must be made for this purpose. The packaging of parts to be shipped to and from a repair point must be studied and the costs determined. This includes possible damage in shipment. Proper identification for the stores department must be included.

Care must be taken to see that the cost and extent of reporting expenses involved in the restoration of parts does not become so involved that it is a burden on the accounting department and thus causes a substantial decrease in reportable savings.

Cost of tools and machines must be given careful consideration as the expense involved may eliminate any future saving to be gained from the restored part. Adaptation of present machines must therefore also be considered.

The major part of the report adapts these principles to the repair of specific parts such as radiators, oil coolers, valve seat inserts, pedestal liners, etc., and with such practices as welding and metal spray. It also deals with items which should be handled by outside shops. The full value of the report requires detailed study.

Fuel Again a Theme at RF&TEA

Open discussion discloses problems which need study. Performance of steam- and gas-turbine locomotives reviewed.

W. H. Fortney
President

L. H. Peters
Sec.-Treas.

In a discussion of fuel losses at locomotive filling stations, the Railway Fuel and Traveling Engineers' Association returned to the consideration of fuel economy during the annual meeting held at hotel Sherman, Chicago, on September 12 to 14, 1955, for the first time since the problem of coal conservation ceased to command attention. There were 9 other papers and committee reports, a question-and-answer panel and three addresses on the program, which comprised five half-day sessions. The question-and-answer panel was conducted by R. D. Nicholson, general road foreman of engines and supervisor of air-brake equipment, New York, New Haven & Hartford. The panel comprised A. A. Michels, Electro Motive Division, General Motors Corporation; E. S. Phillips, Fairbanks Morse & Co.; W. A. Powers, American Locomotive Company, and W. B. Thornton, Baldwin-Lima-Hamilton Corporation. A case study of the causes and remedies of diesel failures was presented by a committee of which R. R. Rich, road foreman of engines of the Chicago, Rock Island & Pacific was chairman. Another committee, of which R. H. Francis, general road foreman of engines, St. Louis-San Francisco, was chairman, dealt with trouble shooting on Vapor-Clarkson steam gemerators. At a joint session of the Air Brake Association and the Railway Fuel and Traveling Engineers Association papers were presented on Air Brake Troubles in Cold Weather, contributed by the Montreal Air Brake Club, and Recent Developments in Air Brake Control, contributed by Westinghouse Air Brake Company. This session was completed with an open discussion on freight train handling.

A paper on Possibilities of Burning Lower Cost Diesel Fuels and Effect of Their Use was presented by Ray McBrian, engineer of standards and research, Denver & Rio Grande Western. Summaries of addresses, the fuel waste discussion, and other papers appear below. The president, W. H. Fortney, district road foreman, New York Central, in opening the meeting, spoke briefly of the opportunities before the meeting, after the lapse of 1954.

Progress a General Responsibility

Responsibility for future progress in the railroad industry is not a job for management alone, but is the duty of "every man on the payroll." So said D. A. Fawcett, vice-president, New York Central in opening his address at the first session of the meeting.

"We are railroading in a great era," Mr. Fawcett declared. He referred to the growing use of electronics, and called Centralized Traffic Control a "great factor" in the industry. By installing CTC between Cleveland and Buffalo, the Central is eliminating two main tracks, Mr. Fawcett said. The two remaining tracks will handle the same amount of traffic as the four did, and with even greater efficiency.

Mr. Fawcett went on to predict "more progress ahead" for railroad motive power. This may include, he said, the use of turbines and, eventually, atomic power.

Turning to a matter "somewhat afield from your meeting here today," he called attention to the need for all-out railroad support or President Eisenhower's cabinet committee report on transportation.

"Acquaint yourselves with the features of this report, and the pending legislation, and let your representatives in Congress know of your position," Mr. Fawcett urged.

"Powerful lobbies are lined up against us, financed by other forms of transportation, and we must use every tool in our command," he declared.

Handle Cars Carefully

To achieve careful car handling, it is most important that men on the ground who handle cars be made fully aware of the factors involved, said C. A. Naffziger, director, AAR Loss and Damage Prevention Section, in his address during the opening session. This year 'round job is now being done by railroads, shippers and the AAR. One of the major factors of careful car handling is that of reducing damage due to overspeed impact. Estimates are that over 50 per cent of the damage to lading and cars is from this cause. A brighter side of this picture is that freight claim payments for the first five months of 1955 are 9.3 per cent below the comparable period of 1954.

Two hundred railroads own and operate over 2,200 impact registers, he said. In addition to these registers, many railroads hold clinic and instruction periods in yards, offices and terminals for train and yard crews, to acquaint them with freight loss and damage due to overspeed impact. Use is made of charts, drawings, photographs, lectures, motion pictures and "fish-bowl" cars showing lading and impact registers.

The various Shippers Advisory Boards have special committees concerned with careful car handling and freight loss and damage. October has been designated as careful car handling month, he said. Railroads and shippers have held seminars at the AAR's laboratory in Chicago, and more are scheduled in the future.

"It's Time to Talk"

Legislation now in Congress to liberalize the regulation of common carriers "should have the support of every railroad man in America," said W. T. Rice, president of the Richmond, Fredericksburg & Potomac. The railroads today have a "great story to tell," he said.

This story includes the fact that "we pay our own way." The land-grant story itself is something we can be proud of—8% of the railroads paid back to the government more than 9 times the value of the land granted, he added.

The Weeks' Report, on which the proposed legislation is based, has the support of many people outside the railroad industry, he said. Legislation embodying most of the report's recommendations has since been introduced in Congress.

Mr. Rice pointed out that this legislation would provide common carriers with new freedom of rate making. Among other things it would restrict the ICC's power of suspension, and empower the ICC to override state commissions in abandonment-of-service cases.

"At no time in our lives has there been so vital a matter before the railroads," Mr. Rice declared.

"Make friends with your patrons," he urged. "See that they know of this legislation; and that they know and understand the railroad story."

Mr. Rice cited the existence of "new methods, new tools and new equipment" as evidence of positive thinking on the railroads. "With these," he declared, "the industry can never go stale."

Waste of Fuel at Locomotive Service Stations

A general discussion on the subject of fuel waste which takes place when locomotive fuel tanks are filled was led by T. J. Conway, transportation assistant, Texas & Pacific. The discussion was participated in by representatives of many roads, all of whom were of the opinion that the amount of fuel being wasted is substantial and that the loss needs to be checked.

Most of the fuel is spilled when the filling hose is disconnected from the locomotive. The loss is partially in the form of dribbles from the hose nozzle and partially a flow-back from the horizontal filler pipe on the locomotive. A change in this pipe was suggested. Some control can be exercised over these losses at small refueling points, but the point was stressed by several speakers that this is very difficult at large stations, particularly where passenger locomotives are fueled. Here theurge to complete the job and get the train on its way leaves no time for the exercise of care to avoid overflowing the tank.

Aside from the loss of fuel—which one speaker said had been measured by collecting the spillage in a sump on one railroad and amounted to 30,000 gal a month at a large point—there is the fire risk arising from ground at filling stations becoming saturated with oil.

Few remedies were offered. At the small points on the New York Central a cart about 4 ft long has been made which is wheeled to the unit being fueled and placed to catch the flow back when the hose is removed. The oil is put back through a connection provided for that purpose. These carts are used only at small points where there is no pressure for time in fueling the locomotives. The Baltimore & Ohio has adopted a similar scheme in the form of cans with wide funnel openings.

Improvements have been made in the hose leakage by the use of different end valves. Some of the trouble here comes from injury suffered by the hoze nozzle from rough handling which destroys the tightness of the valve. The Pennsylvania has vent alarms on some of its locomotives, which are said to be successful in preventing overflowing the tank.

It was suggested that the overhead hose connections should be changed to a connection such that the hose nozzle would be above the connection so that the oil remaining in it after the locomotive has been fueled would drain back into the tank.

One speaker thought that supervision of refueling should prevent waste of fuel. Another agreed that supervision had its place, but that it would be better to provide the men who do the refueling with proper tools to work with—something in the nature of an adequate warning before the tank becomes full.

Another suggestion was that something might be developed similar to the automatic shut-off which stops the gasoline pump when the tank is full in automobile service stations.

UP Gas-Turbines Are Smooth Operators

C. Shipman,
Road Foreman of Engines,
UNION PACIFIC

(Mr. Shipman opened his paper with a brief description of these locomotives. The turbine is rated at 4,500 hp for traction. The locomotives are geared for a top speed of 65 mph. Starting tractive force is 137,930 lb, based on 25 per cent adhesion, and maximum continuous tractive force is 130,000 lb at 10 mph.* He continued as follows.)

The turbine is started by a four-position switch in the cab. From Position 1 to Position 2 starts to crank the turbine with the diesel engine. Position 3 transfers the turbine from the diesel to Bunker C fuel.

* For a description of the first of these locomotives, see *Railway Mechanical Engineer* for July, 1949, page 363.

Position 4 shuts off the diesel and hooks up the turbine ready to move the locomotive. From here on control is through relays.

Average fuel consumption of the turbine is approximately 350 gallons per hour. Since the turbine idles at a speed approximately 5,200 rpm (full-load speed is 6,900 rmp), it will be seen that idling time must be held to the minimum to avoid waste of fuel. That is why we can shut the turbine down on descending grades and use the auxiliary diesel engine to maintain air and to supply field current for the dynamic brakes, which is a great savings in fuel.

These gas turbines are all equipped with automatic transition and have a throttle with 20 notches. Due to bad rail conditions at times over the district on which the turbines operate, there is a reduced-power switch in the cab of the locomotive. When rail conditions are bad we can reduce the power of the lead pair of wheels by placing this switch in reduced-power position, which will take about 250 hp off of the two lead pairs of truck wheels. This switch can be reduced or put into full power with the throttle in any position without any damage to any equipment.

On ruling grades over the territory where the turbines now operate, the turbine with 5,000 tons will handle the train 3 to 4 mph faster, and 6 to 8 mph faster on a level track.

Engine crews will tell you that with the present turbine throttle with 20 notches they can start a train easier and smoother than with any other power that we have. We very seldom have any train break-in-two's with turbine power and this, no doubt, is due to having all of our power in one unit and 20 notches on the throttle so that we can control it much more uniformly.

Where drifting downgrade with trains we have very little trouble with run-ins and run-outs. No doubt, this advantage is gained from having all of our weight on one power unit.

One of the most discussed and most misunderstood features of the gas turbines is the exhaust and noise that they make from final exhaust. Actually, at full speed, there is not as much noise in the cab of the turbine locomotive as there is on a 16-cylinder diesel unit and it is very easy for crews to converse in the cab of the turbine at all times. Engine crews will tell you that they would rather have the turbines than any other power we have operating because they are easily handled and that they will get over the road much faster than the other class power we have.

Discussion

The following information was developed in response to questions asked after Mr. Shipman had presented his paper:

Propane is a satisfactory fuel for the turbine locomotive. Its experimental use on one locomotive has not been extended, however, because the cost of providing the equipment to handle the fuel over the entire line over which these locomotives operate would have been prohibitive. The fuel now used is called Bunker M by the refineries. The Bunker C fuel, which the road formerly used, was washed and strained by the road, removing the soda ash. This is now done at the refineries and the fuel as marketed renamed.

Trouble was experienced in operating through tunnels from the exhaust gasses getting into the air intake to the compressor. This has been improved by adopting a 60-deg exhaust stack which has served to keep the gasses away from the air intake at an expense of a 5% power loss. When operating at 15 mph there is no trouble of this kind with the turbine, but the lube oil will sometimes get hot and operate the lube oil shut down when the speed drops below 5 mph. When this happens the fuel pipes are cleared of Bunker C oil in a purging cycle with distillate. It sometimes takes 30 to 40 mins before turbine can be started again.

The throttle on the early locomotives increased the engine speed gradually until it reached full load speed at the thirteenth notch. On the later locomotives, with the transition lever in the No. 1 position, the turbine is brought up to speed and the throttle only controls the excitation to the generators. This gives a finely graduated start. There are four transitions. The throttle must be in the 20th notch before the motors can be shunted.

The locomotives operate between Ogden, Utah, and Cheyenne, Wyoming, a distance of 500 miles. They usually run through without being taken off the train. When one is cut off and sent to the roundhouse at a terminal, if there is no electrical trouble or other equipment broken down, it can be back on the train in 45 min. No maintenance men are traveling with these units.

The only place where the unit is noisy is on the ground alongside the turbine.

No move has been made to use these locomotives on passenger trains. The steam generator, used to heat the fuel oil, is not of sufficient capacity to heat a passenger train.

Pennsylvania School for Engineers

In 1946 a number of locomotive firemen returning from military service had to take examinations for their promotion as outlined in the working agreement (1-B-1 and 1-B-2). A fireman had 30 days to prepare himself and pass examinations in air brakes, steam locomotive machinery, electric locomotives and rules. This was a big undertaking. The general chairman of the Brotherhood of Locomotive Firemen and Enginemen, W. B. Woodward, Jr., in conjunction with H. L. Nancarrow, then General Manager of the Eastern Region of the Pennsylvania, met with Colonel N. Nathanson, Director of Veterans Education, and Dr. W. E. Brunton, Director of Vocational

Education. The Pennsylvania Railroad Instruction School was opened on January 6, 1947, as a G. I. school under the direction of the Veterans Administration, the Bok Vocational School and the Pennsylvania.

Non-G. Is in great numbers applied for admission and six months later it became an open school for all men of all crafts in the railroad field. Men from other railroads also asked permission to enter the school and were given permission to attend these classes.

Attendance since January 6, 1947, to January 6, 1955, has been 59,639. Students attend on their own time after working hours, on their days off, etc. Several men who live at a distance from the school have come to Philadelphia and lived at the Y. M. C. A. for as high as two weeks at a time on their own expense, to prepare themselves for their examinations. The teaching staff is made up of men who know their subjects and have the ability and the personality for instructing a course in diesel locomotives, electric, air brakes and rules.

Admittance to classes is by application, filled out by those interested and placed on file. Classes are called by the date of the application, so that no partiality is shown.

Classes are arranged to suit the students and the hours they are working. They attend two classes a week, two hours a day. An extra half hour added on to the two hours causes the student to become tired and he gains little and will lose a lot of what he has received in the two hours he has already attended.

Friday is an open day where the students who have been forced to miss classes during the week, due to sickness, vacations and working conditions, may come in and catch up. It is also a day set apart for special training by appointment only.

During regular classes instructors never ask an individual student a question, though we do ask questions of the class group. The reason for this is that many students become stage frightened and cannot answer, though they may know the answer to the question asked. This becomes an embarrassment to them and many times they do not return to classes. But the students are encouraged to ask questions on the subject being taught at the time.

All subjects are thoroughly taught. In air brakes, for instance, there will be men from all crafts, from laborer to supervisor. We try to have only 15 students to a class. These students are asked to bring with them a loose-leaf note book, and a box of water-colored pencils with which they color the flow of air, part by part. When the course is completed, which takes about 3½ to 4 months, the student will have a complete set of colored charts, which starts at the compressor and covers every type of locomotive and car valve.

Large wall charts are used in teaching, of which we have 146 in our course on Air Brakes along with 93 air-brake parts, which the students take apart and reassemble.

At the completion of the course a certificate is given each student. We have also found that the school has created a wonderful human relationship. Invitations are sent out from our student file inviting them and their families to take part in commencement exercises. No classes are held this day but instead we have open house from 9:00 am to 9:00 pm. Coffee and cake are served throughout the entire day and door prizes are given out in the evening.

We give five book prizes for the best kept note books. This creates an interest in the students keeping a neat note book during the course.

In the evening we have a special program with several representatives of management, labor and school boards present, who assist in giving out certificates to outstanding students of each class for that year. These students are picked, not only by the instructors but by the student body also.

The school has more than paid for itself through the knowledge of its employees. (Of course this does not show on paper.) One illustration—A laborer had just completed his speed-control course. He was working at an engine storage yard, when a locomotive had an operation of speed control. The employees on this locomotive, not knowing what to do, called for assistance. Many tried to help. It was the laborer who knew and went out and was able to clear it up, thus saving a passenger detention.

Before closing the second part of this paper let me give you a few good hints which have made, and will make, a successful school. Let us call them the ten commandments of a Successful School. In the training of locomotive personnel—

1. Pick out a good, desirable location where it is centralized for students to attend. Ours is in 30th Street Station, handy for men riding to and from classes by train.
2. Pick a good size room with plenty of light and ventilation, clean, attractive and inviting to those attending. Arrange your work tables in the form of a horse shoe so the instructors may work around and with each student.
3. Have plenty of working equipment around the room. In the front of the classes have a work table where the equipment may be taken apart.
4. Pick a person for instructor who has personality, patience and ability plus —who knows his subject and how to present it.
5. Never talk, or let be talked, religion, politics or union regulations in the classroom. Have this understood at the very beginning of the class.
6. If a student is absent find out why. If he is sick send him a get-well card which has been signed by his associates. It will do a lot, not only for him, but for those sending.
7. Do not allow arguments in a class. They create hard feelings and never work out for the good of the class.
8. Work hard with those who may not grasp as fast as others, but be careful not to show any partiality.
9. If you are teaching air brakes do not let a student question you on the diesel or electric course. After class it is all right but not during the class.
10. Have an instructor for each subject, with separate classes.

My dream of the future is a universal railroad school which will cover all railroads over the entire United States, with little or no cost to the individual railroad itself. How, you may ask, can this be done?

1. By having schools located at terminal points over the entire United States, open to all railroads. To these schools would come the men and women employed by the railroads who live near these cities and are seeking education in this field.
2. The schools could be sponsored by the unions, through their general chairmen, local chairmen and stewards; by railroad management of the different railroads and by the State Board of Education.
3. The center of the Railroad Board of Education could be the A. A. R. at Washington, D. C.
4. The instructors would be carefully picked local men from different railroads, well trained in the subject to be taught.
5. The curriculum would consist of courses in air brakes, diesels, operating rules and signals, Pullman porter and dining service, police, car movements and tracing, etc.
6. Who would pay for this program? The School Boards. For the railroads pay out millions of dollars per year school taxes and derive not one cent back for its output. In other words, it would be vocational education, with schools on railroad property.

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J. A. MacLean, Jr., president, MacLean-Fogg Lock Nut Co.

J. F. Corcoran, director sales, Union Asbestos & Rubber Co.

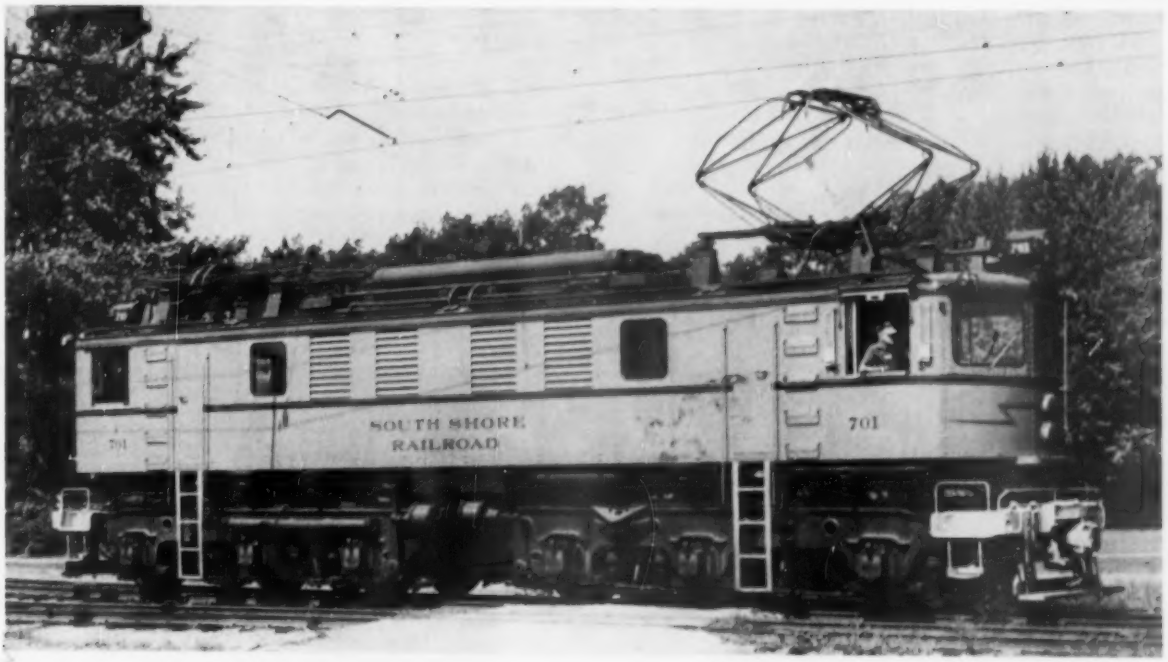
F. L. Brownlee, manager, Railroad Division, Combustion Engineering Co.

Hunter Russell, vice-president, Spring Packing Corp., Chicago

REGISTRATION AT SEPTEMBER 1955 COORDINATED MECHANICAL MEETINGS

Association	Sunday, Sept. 11	Monday, Sept. 12	Tuesday, Sept. 13	Wednesday, Sept. 15	Total 1955	Total 1953
Air brake	41	85	34	9	169	192
Car Department Officers	80	221	92	40	433	520
Locomotive Maintenance Officers	89	466	134	28	717	950
Railway Fuel and Traveling Engineers	91	120	28	28	267	322
Railroad Total	301	892	288	105	1,586	2,156*
Railroad guests	8	9	93	—	110	—
Allied Railway Supply	638	697	146	41	1,522	869
Grand total	947	1,598	527	146	3,218	3,025

*Includes 172 members Master Boiler Makers Association.



One of the converted locomotives as it appears in service.

South Shore Is Rebuilding Ten NYC Electrics

By M. Aldrich
Master Mechanic
Chicago, South Shore & South Bend

In December 1954, the Chicago, South Shore and South Bend purchased two New York Central type R-2 electric locomotives formerly used in freight service on the Harmon Division. The South Shore also secured an option to purchase eight additional units depending on the performance of the first two after conversion from 600- to 1,500-volt operation.

The first locomotive was converted by railroad shop forces, placed in service in June, 1955, and the option for the purchase of the eight additional was exercised. This order was placed in August, 1955 and delivery is being awaited.

As these locomotives are converted the 85- and 100-ton locomotives now in service on the South Shore, will be retired and disposed of.

One converted R-2 locomotive will be equivalent to two 85- or 100-ton locomotives which are operated in pairs. Therefore, 8 will be a replacement for 12, 85-ton locomotives and 4, 100-ton locomotives, with the other 2 being additional motive power.

Use of the converted locomotives will result in lower operating and maintenance cost as the number of units will be cut in half, and since they have C + C wheel arrangement, are more suitable for road service than are the present B — B units.

The conversion of the locomotives for service at 1,500 volts d-c operation involves the following basic changes:

Traction motors are reconnected, two permanently in series. They are rated 750 volts and insulated for 1,500 volts to ground.

Accelerating and motor combination contactors are reconnected for motor combinations of six in series, three in series, and two in series.

Accelerating grids are replaced and reconnected to adjust for reduced locomotive current due to series con-

nection of traction motors. Six hundred-volt air compressors and blowers are replaced with 1,500-volt machines.

Controllers and control circuits are remodeled so as to give series, series-parallel and parallel operation of traction motors instead of series-parallel and parallel operation as used on 600-volt operation.

A motor-generator set is installed for battery charging, lights and control, instead of series charging from the ground side of the heaters or blowers. Pantographs for overhead current collection are installed to replace third rail current collecting equipment.

Large sealed-in windows are installed in ends of cabs which replace clear vision windows, thus giving increased comfort and vision to the operator.

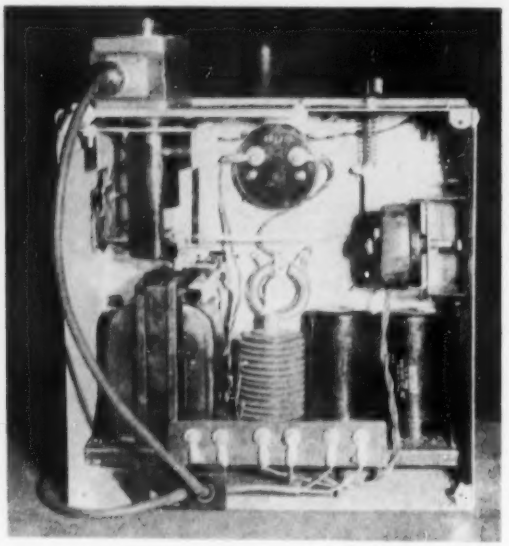
Side entrance doors are installed to replace a single door in the front end of the locomotive. The equipment compartment is lengthened 35 in. on each end by moving the operating cab forward, thus providing for side aisles and rearrangement at compressors and blowers.

Radio equipment is installed to provide communication with the train dispatcher, and other mobile units, including walkie-talkie equipment used in cabooses.

Equipment for making the changes outlined above was purchased from the New York Central, and consisted of equipment removed from the Cleveland Union Terminal locomotives which are being converted by the New York Central for use in passenger service on the Harmon Electrified Division.

The rebuilt locomotives are being assigned a 700 series number as converted, and will be known as the 700 Class locomotives.

A solenoid, pointed to by the operator's cap visor, under test.



Rear view of solenoid tester, with cover removed.

Solenoid Tester

The device shown in the illustration used for testing the two solenoids used on General Electric 17MB6 governors was developed in the Baltimore and Ohio's Glenwood, Pa., shops. It is necessary to determine that the solenoid plunger or armature does not bind against the springs at the top of the solenoid, to see that there is not too much play in the ball joint between the armature and the turbine arm, and that the armature is in balanced position when the current flow through the solenoid coil is 475 milliamperes.

The solenoid to be tested is mounted on top of the test box at the right as shown. The lower end of the turbine arm is in contact with the long pointer arm. The free end of the pointer appears over a scale under the oblong glass at the left and the turbine arm is connected to the pointer arm so that the movement of the end of the pointer multiplies the movement of the turbine arm at a 14 to 1 ratio.

Just below the solenoid in the front panel is a magnifying glass, through which the operator may see an enlarged image of the ball joint. Also at the position of the operator's finger is a small lever by means of which he can move the pointer arm manually. This permits him to determine if the solenoid armature is free and if there is excessive clearance in the ball joint of the yoke. To find if the solenoid is properly balanced, the operator adjusts the current through the solenoid to 475 milliamperes as indicated by the meter on the panel. With this current flowing through the solenoid, the pointer should be in mid-position. It is an extremely accurate test which shows any irregularity of movement of armature under test.

The equipment in the case includes a transformer, a small dry-plate rectifier, capacitors, a rheostat, a milliammeter, a dial light, an inside light to illuminate the portion of the pilot valve plunger seen through the magnifying glass and necessary wire and switches.

Ice water being poured on a fused quartz lamp to show its thermal and shock resistant qualities.

This portable oven unit equipped with 12, 1,000-watt quartz infrared lamps does a fast, efficient job of expanding bearing assemblies for easy fitting to heavy equipment. Oven is well ventilated and insulated. Six switches provide flexible control. Individual reflector units used are commercially available.

Infrared Shrink Fitting

By R. L. Henderson
Illuminating Engineer, Lamp Division
GENERAL ELECTRIC COMPANY

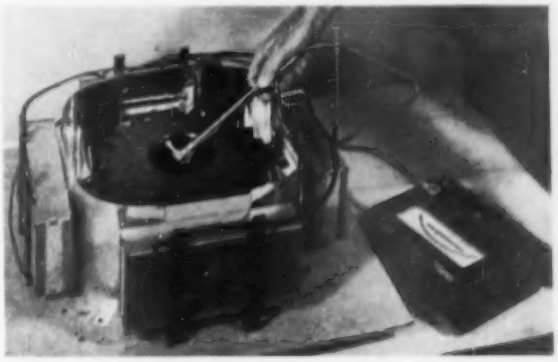
A NEW METHOD OF HEATING large pinion gears, bearing races, couplings and other machine parts to be shrink-fitted into mating shafts, has recently been made available. This is by the use of infrared quartz lamps as the heat source. The lamps required are now commercially available in seven sizes with a variety of lengths and wattages.

The advantages of these new lamps are many. They produce high energy concentrations in a small space,—100 watts per lighted inch of tube length; they produce full radiation almost instantly, not requiring a warm-up period; they produce visible light as well as infrared radiation (an advantage in some circumstances); they are extremely light in weight; and they require little maintenance having a rated trouble-free burning life of over 5,000 hours.

Because of the very close tolerances required in shrink-fitting, special care must be taken to keep the temperature within specification. In the case of diesel traction motor pinions, if the temperature is too high, the pinion will advance too far on the shaft and may split. But if the pinion is not heated enough, the advance will be less than that required and the pinion will slip on the shaft.

A new oven has also been developed so that these lamps may be used to advantage in this particular shrink-fitting operation. Seventeen tooth pinions were brought to a temperature of 360 deg F in less than 15 minutes in the oven, and 23 tooth gears to the same temperature in less than 30 minutes. By comparison, 21 tooth gears were heated by conventional methods and also by using radiant energy. The initial temperature of these gears was 78 deg F at the start. In 22.5 minutes, the temperature of the gears heated by conventional methods was only 170 deg F, while the temperature of the gears heated by radiant energy was 322 deg F. All readings were taken inside the pinion bores. Temperature readings inside the bores of the gears in the infrared unit were uniform and skin effect was slight.

The great advantage of the radiant energy method is the total absence of a warm-up period. Complete control



A newly developed quartz oven which contains four fixtures, each holding two 500-watt, 115- 120-volt quartz lamps. The eight lamps are connected in parallel, drawing approximately 33 amp. The reflector material is Alzak and the fixture base is transite.

of the temperature rise of the Metal part being heated can be maintained at all times. In addition, the infrared-type of oven has the following outstanding features;

1. It is light in weight and can be easily carried by one man.

2. It can be operated on conventional 115-120 volt circuits.

3. It is flexible. Circuit connections can be altered for series, series-parallel, or parallel operation of the lamps depending upon the available voltages and on intensities desired. The shape or size of the unit can also be altered to suit the circumstances.

4. It is relatively inexpensive to build and operate. The cost of the power used in heating the 21 tooth pinion gears was approximately 2 cents.

5. It requires little or no maintenance. The quartz lamp has a life in excess of 5,000 hours, if operated at conventional voltages, and is also resistant to thermal shock.

There are many other applications of these new lamps in industry. For example, they are now also being used to bake motor armatures.

Tips on Care of V-Belts

TO ASSURE LONG LIFE and proper operation of V-belts, the first step is to make sure the proper V-belt is selected to fit the pulley exactly. There are belts for all pulley sizes. If the pulley groove is too wide or too narrow, the belt will not pull properly.

Pulleys must be kept properly aligned. Misalignment causes excessive belt and pulley wear and shortens the life of the belt drive. Increasing the tension of a V-belt in worn or oversized pulley groove will simply make the pulley and belt wear even faster. The pulley should be regrooved or replaced.

Glazed belt sides, loss of power, belt whine and overheating are all signs of V-belt slippage. Here again, the pulleys should be checked for excessive wear.

Belts should be adjusted so that they are neither taut nor slack. The proper tension is indicated by a live, springy action.

When one belt in a multiple drive wears out, all should be replaced. In the long run, this is much cheaper than simply replacing the worn part. Where one belt is new and the rest are used, the new belt will have to carry most of the load and will wear out much sooner than it should.

The accurate matching of V-belts is even more important on railroad equipment than in industry because of space limitations, high temperatures and continuous operation. To minimize the amount of down time required for repairs, complete replacement sets of V-belts should be kept on hand.

V-belts should never be pried onto pulleys. The proper installation method is to loosen motor mount bolts or idler lock nut, slide the motor forward, or relieve the idler tension and drop the belt over the pulley. If belts are pried, the stretch-resistant cords may be damaged or broken.

Where belts are to be used for excessively hot or oily operations, there are cog-type belts, made of special rubber compounds which effectively resist oil, grease and heat.

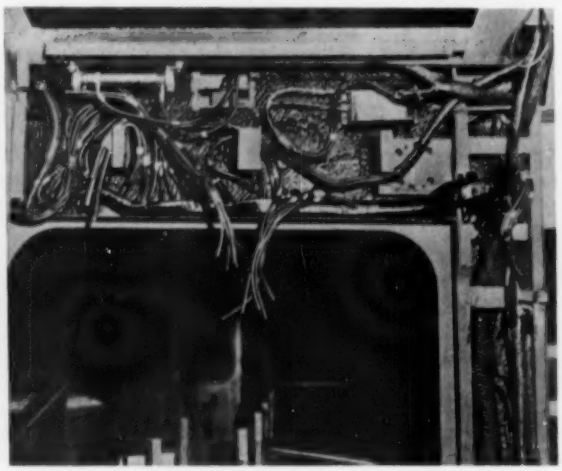
Two of the 250 subway cars built by the St. Louis Car Company for the Chicago Transit Authority.

Prefabricated Assemblies for Car Wiring

PREFABRICATED ASSEMBLIES of wiring have played an important role in the construction of 250 subway cars by the St. Louis Car Company for the Chicago Transit Authority.

Approximately 247,000 ft,—more than 46 miles,—of National Electric Products Corporation car wire was used in the installation. The 600-volt wire, ranging in sizes from No. 4 to No. 16, was used throughout the interior of the cars to provide electrical service for lighting, air-conditioning, heating, communications and general operations.

Assembly lines were used to fabricate much of the wiring which went into the cars. Considerable saving in construction time was reported as a result of the prefabrication and the use of wire with a small overall diameter. The wire used has a neoprene jacket as protection against acids, heat, oil, moisture and the heavy vibration conditions encountered in railroad service.



An example of the prefabricated wire assemblies and duct used in wiring the cars.

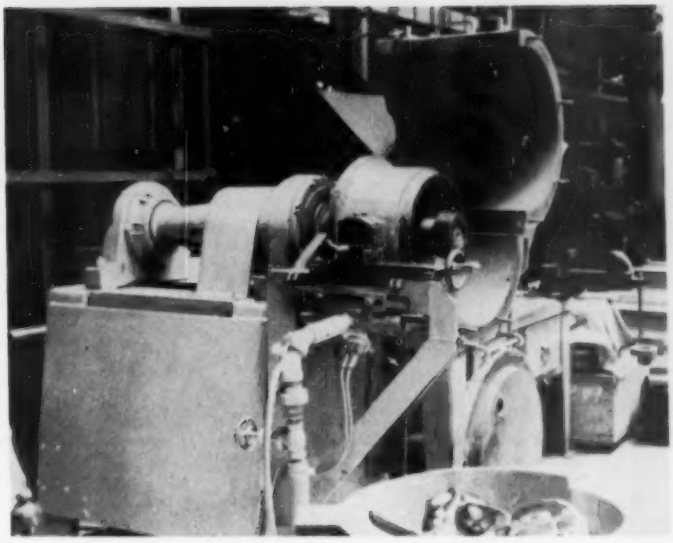


Fig. 1—Commutator seasoning machine with hood open and grinding head in place.

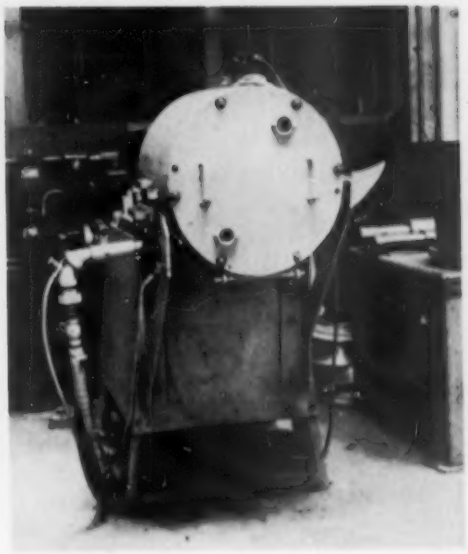


Fig. 2—With the hood of the commutator seasoning machine closed, heat is contained and temperatures of all parts are uniform.

Commutator Seasoning In the Railroad Shop

■ Facilities have been developed in the Silvis, Ill., electric shop of the Rock Island for seasoning commutators which have been removed from the armature and also for seasoning commutators which are mounted on the armature.

Commutators removed from the armature are seasoned in the machine shown in Figs. 1 and 2. For this operation, they are run at a speed of 2,750 rpm, while they are heated, and held at a temperature of 320 deg F. They are

> Rock Island makes a practice of seasoning all traction motor commutators which have been in any way disturbed

run for a period which may vary from 16 to 90 hours until the commutator is seasoned as indicated by feel with the

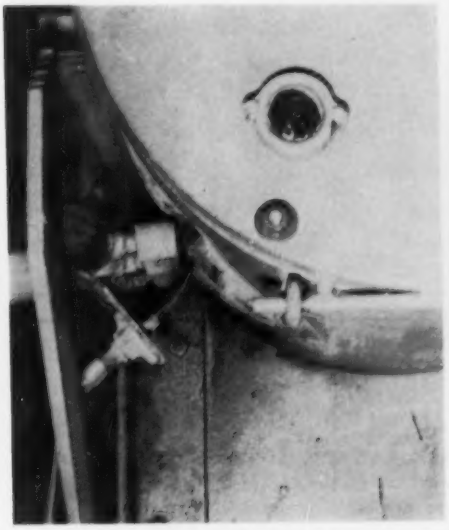


Fig. 3—The gas burners and electric gas lighter at the base of the machine.

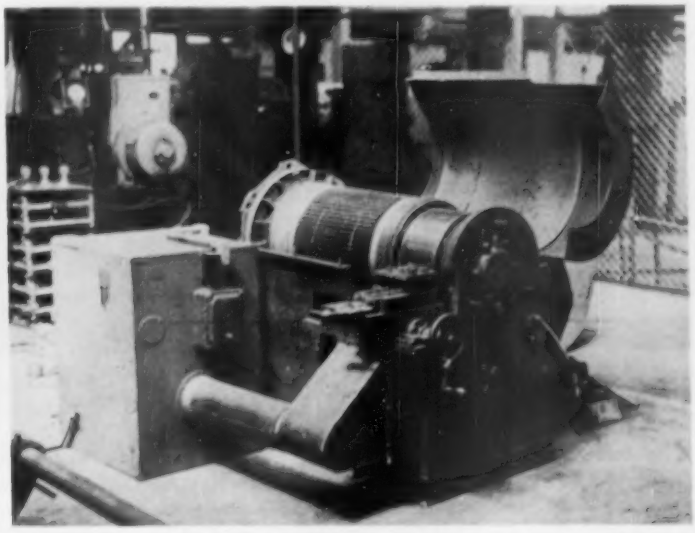


Fig. 5—The machine used for seasoning commutators after they are applied to a rewound armature.

Fig. 4—Commutators are ground after the first seasoning operation.

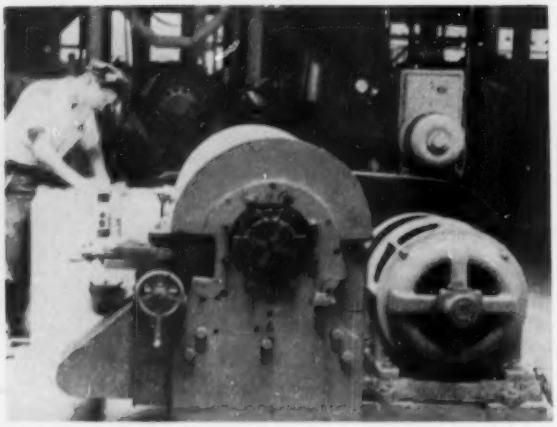


Fig. 6—An operator make a periodic record of temperature during a seasoning operation.

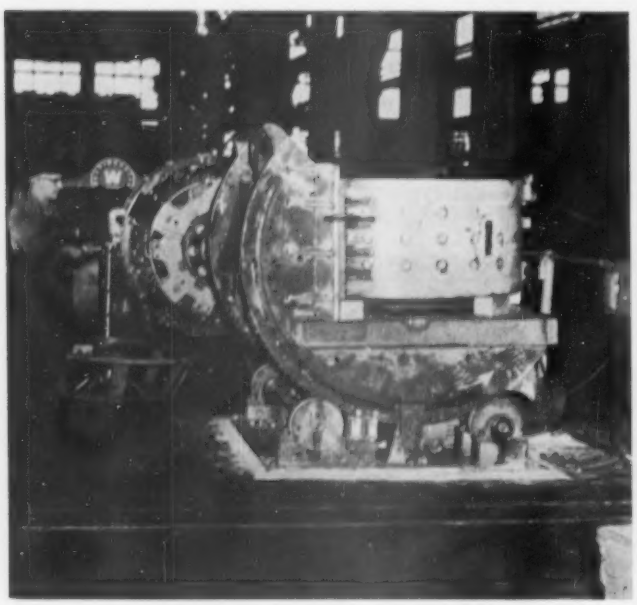
corner of a graphite brush held against the spinning commutator.

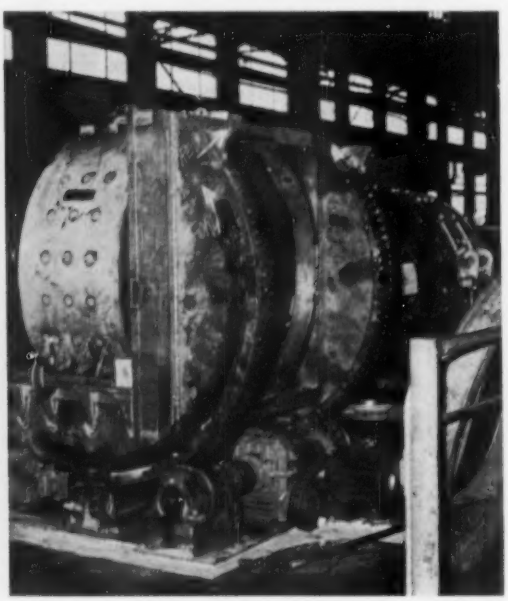
The heat is supplied by gas flames. The burners at the bottom of the seasoner housing are shown in Fig. 3. The gas is ignited electrically and a baffle inside the housing keeps the flame from actual contact with the commutator. The housing retains the heat from the flames and equalizes the temperature on cell parts of the commutator.

Normally, the commutator is seasoned for 16 hours, ground with a stationary stone at 300 to 400 rpm, and seasoned again for five hours. It is then checked for smoothness. If it does not pass this test, it is run again for eight hours—reground—run for five hours, and rechecked.

Then if it does not pass the test, the commutator is placed in a hydraulic press. A pressure of 50 tons is applied and the bolts are drawn up with a torque of 320 ft-lb, while the commutator is under pressure. The seasoning process is then repeated.

After rewinding, the commutator is again seasoned on the armature seasoning machine shown in Figs. 5 and 6. Commutators are rebuilt if no more than 16 bars, consisting of 4 bars in 4 sections are required for repair.





Up-Ender—Large Size

By increasing the dimensions, motor size and gear-drive capacities of an up-ender for traction motors, the generator up-ender shown in the illustrations was made. It is a product of the Canadian National Pt. St. Charles shops, and has proved its value as an aid to diesel locomotive generator overhaul. The machine is operated by pushbutton controls on the end of a control cable. It may be stopped in any desired position and limit switches prevent its being moved more than a total of 90 deg past the full vertical or full horizontal positions.

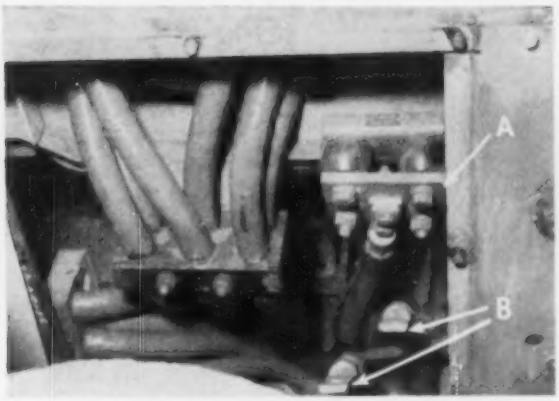


Fig. 2—Alco locomotive. The positive terminal strip is shown at *A* and the No. 1 and No. 4 traction motor armature leads which have been removed are shown at *B*.

How to Find Diesel Locomotive Grounds

By Wayne E. Abbott

■ Diesel locomotives are equipped with a ground relay and warning signal which operate when the insulation resistance to ground is low. All grounds result from a path of low or no resistance developing so that the power circuits are connected to the locomotive frame. This is not desirable so warning is given by the ground relay operating.

The most common grounds of power circuits result from flashovers at the main generator, traction motors, or both and from moisture and dirt. The ground from a flashover is easily found by inspection. Clearing it is accomplished by cleaning insulators and string band where the path of the ground developed.

To insure that the same condition will not be repeated

> By opening circuits in the right places, it becomes relatively easy to isolate parts of the equipment for making ground and insulation tests.

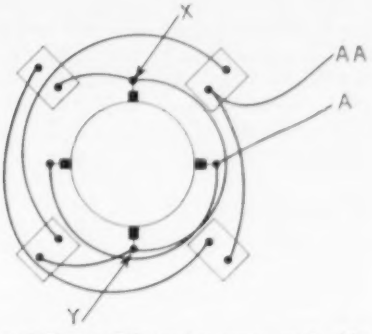


Fig. 1—General Electric 731 traction motor used with Alco diesel switcher locomotives. Only armature and interpole circuits are shown since fields were isolated by placing the reverser in neutral position. *Open at X and Y and insulate.*

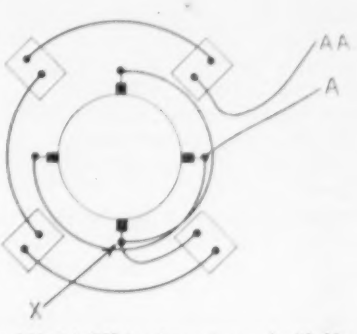


Fig. 4—General Electric 752 traction motor used with Alco diesel locomotives. Only armature and interpole circuits are shown since fields were isolated by placing reverser in the neutral position. *Open at X and insulate.*

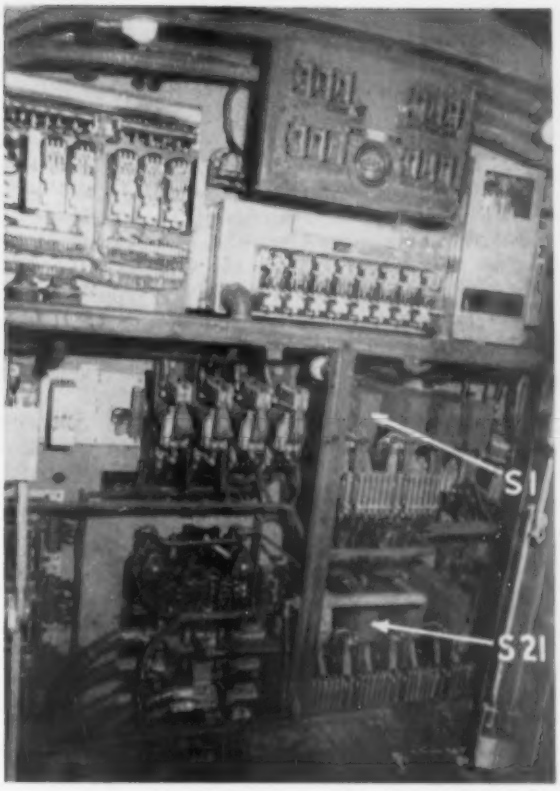


Fig. 3—Control panel for an Alco locomotive showing the location of the *S1* and *S21* power contactors.

again soon, all possible surfaces to ground must be clean of carbon or metal deposits. Poor commutation can be one of the principal causes of both generator and motor flashovers. Poor commutation may be due to sticking brushes, dirty commutator, light brush hammer pressure and commutator out-of-round. Some flashovers are believed to start at the traction motors when there is a wheel slip, particularly at high locomotive speed when all wheels slip. Wheel slip relays are no protection on most locomotives under this condition.

Since the moisture and dirt from oil, water, carbon dust and other dirt will often form a path from some part of the power circuit to ground, which is the locomotive frame, some method of cleaning must be used. This type of ground, either solid or of very low resistance, is often in out-of-sight places in motors and generator. Most of this type of ground develops on the road when motors and generator are under load and therefore warm. Heat alone will not clear the ground nor will it clear away the accumulation of dirt. One of the common methods used for cleaning generator and motors is the use of one of the many electrical cleaners which have been developed for this purpose. The cleaner is used in a spray gun with air pressure to force it in and around the windings.

A Megger instrument reading in most cases is an overall reading of the power circuits to ground. The shortest possible method to isolate the different parts of the power circuits should be used so that the part at fault can be determined.

The following procedure has been found worthwhile, and if a record is kept of the Megger reading, this will afford a helpful check if at a later date there should be another low reading. Cleaning with any of the common methods may bring the reading up, but if repeated cleaning is required, it will be an indication that that part of the circuit must be checked often.

Isolating Power Circuits

Alco 660- and 1,000-hp Switchers

To isolate traction motors from the main generator power circuits for locating the source of a low Megger reading, the following procedure is suggested.

All cables and wires that are disconnected are to be kept clear of each other and ground.

Place the reverser in neutral position.

Open the ground switch.

Take the Megger readings down the left side of the reverser to ground.

AA1 reads No. 1 and No. 2 traction motor armatures, interpoles and leads in series.

J3 reads main generator, No. 3 and No. 4 traction motor armatures, interpoles and leads.

AA3 reads main generator, No. 3 and No. 4 traction motor armatures, interpoles and leads.

J1 reads lead from the reverser to the stationary side of the S contactor.

Take Megger readings down the right side of the reverser.

FF2 reads No. 1 and No. 2 traction motor fields and leads in series.

FF1 reads No. 1 and No. 2 traction motor fields and leads in series.

FF4 reads No. 3 and No. 4 traction motor fields and leads in series.

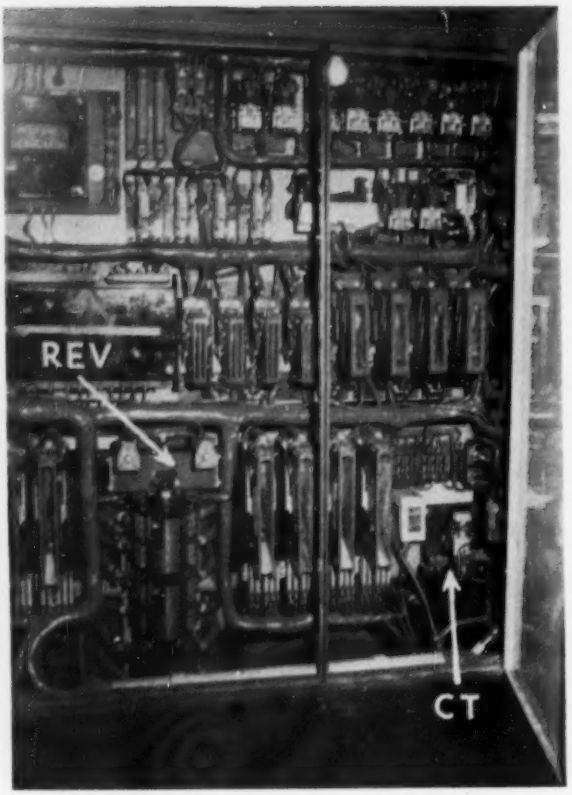


Fig. 5—Control panel for a Baldwin-Westinghouse road switcher showing the location of the *CT* relay.

FF3 reads No. 3 and No. 4 traction motor fields and leads in series.

If a low Megger reading was found at *AA1* on the reverser, open the wheel slip resistor leads and open *AA2* at the No. 2 traction motor. This will isolate the armature and interpole circuits between the No. 1 and No. 2 traction motors.

If the low Megger reading was found at *J3* and *AA3* on the reverser, open the wheel slip leads at the resistor, open *A4* at the No. 4 traction motor, and remove all leads at the stationary side of *SP2*. This will isolate the main generator from the No. 3 and No. 4 traction motor armature and interpole circuits.

If a low Megger reading is found in the No. 3 and No. 4 traction motor armature and interpole circuits, open *AA4* at the No. 4 traction motor. This will isolate the armature and interpole circuits between these two motors.

To isolate the traction motor armature from interpole circuits of Alco switchers, open leads at 12 and 6 o'clock brushholders, as shown in Fig. 1, and insulate. Take Megger readings at brushholders and interpole leads.

Alco Road Switchers

To isolate traction motors from main generator power circuits for locating the source of a low Megger reading, take off the bottom panel, left of center, down back of the control panel. This will expose the positive terminal strip, as shown in Fig. 2.

Disconnect the two cables, as shown, one on the right and one on the left, and keep clear of ground and each

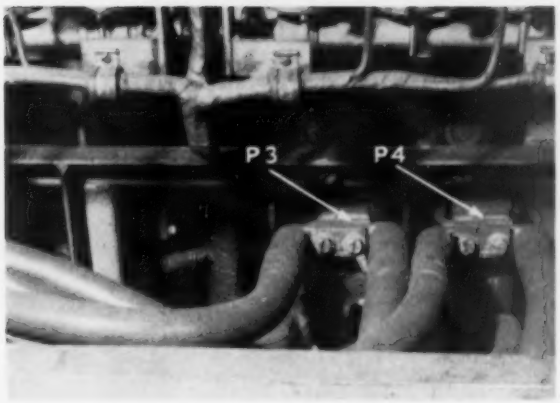


Fig. 6—The P3 and P4 cable connections on a Baldwin, Westinghouse road switcher.

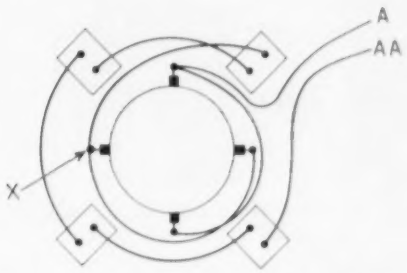


Fig. 7—Westinghouse 352 traction motor used with Baldwin and Lima-Hamilton diesel locomotives. Only armature and interpole circuits are shown since fields were isolated by placing the reverser in neutral position. *Open at X and insulate.*

other. Open the ground switch and place the reverser in the neutral position.

The two cables removed from the positive terminal strip are the armature leads for the No. 1 and No. 4 traction motors. They each have a designating band.

Take Megger readings as follows.

No. 1 traction motor armature lead reads armature, interpole and leads.

No. 4 traction motor armature lead reads armature, interpole and leads.

No. 2 traction motor armature lead reads armature, interpole and leads from the movable side of *S21, S1* shown in Fig. 3.

No. 3 traction motor armature lead reads armature, interpole and leads from the movable side of *S1*, also shown in Fig. 3.

All traction motor field and lead readings are taken at the *M* contactors.

Main generator Megger readings are taken at the brushholders.

To isolate traction motor armature from interpole circuits of Alco road switchers, open leads at the 6 o'clock brushholder, as shown in Fig. 4, and insulate. Take Megger readings at brushholders and interpole leads.

Baldwin 1,200-hp Switchers

To isolate traction motors from main generator power circuits for locating the source of a low Megger reading, it is first necessary that all cables and wires that are disconnected are kept clear of each other and ground.

Place the reverser in neutral position and open the ground switch.

Take the Megger readings down the left side of the reverser.

AA4 reads the No. 2 and No. 4 traction motor armature, interpoles and leads in series.

F4 reads the No. 2 and No. 4 traction motor fields and leads in series.

FF3 reads the No. 1 and No. 3 traction motor fields and leads in series.

AA3 reads the No. 1 and No. 3 traction motor armature, interpoles and leads in series.

Main generator Megger readings are taken at the brushholders.

If there is a low Megger reading at the reverser, left side, the motors involved that are in series, can be further isolated by opening the leads under the left side of the frame. If the low readings are in the armature circuits, the leads must be removed from the wheel slip resistors.

Baldwin Road Switchers

To isolate traction motors from main generator power circuits for locating the source of a low Megger reading, place the reverser in neutral position (top portion of reverser is shown at lower left in Fig. 5). Disconnect the two cables at the left side of *CT* (*CT* is shown on Fig. 5, at the lower right corner).

Disconnect the two cables from the top back of both *P3* and *P4* as well as the A + wire. *P3* and *P4* are shown in Fig. 6.

Open the ground switch.

Take Megger readings as follows down the left side of the reverser.

AA3 reads No. 3 traction motor armature, interpoles and leads in series.

FF3 reads No. 3 traction motor fields and leads in series.

AA2 reads No. 2 traction motor armature, interpoles and leads in series.

FF2 reads No. 2 traction motor fields and leads in series.

AA1 reads No. 1 traction motor armature, interpoles and leads in series.

F1 reads No. 1 traction motor fields and leads in series.

FF4 reads No. 4 traction motor fields and leads in series.

AA4 reads No. 4 traction motor armature, interpoles and leads in series.

The main generator Megger reading is taken at *CT*.

Lima Road Switchers

To isolate traction motors from main generator power circuits to locate the source of a low Megger reading, place the reverser in neutral position.

Disconnect the three leads at the positive terminal of main generator. Two of these are power circuit leads and one is from a starting contactor. Disconnect two leads at the left side of *CT*.

Disconnect *AA* + and *A* — at the wheelslip resistors.

Disconnect *A* + and *A* — at *GR*.

Disconnect *A* + and *A* — at *FS1*.

Disconnect *A* — at *TR*.

Pull the battery switch. Take Megger readings as follows down the left side of the reverser.

AA2 reads No. 2 traction motor armature, interpoles and leads in series.

F2 reads No. 2 traction motor fields and leads in series.

AA3 reads No. 3 traction motor armature, interpoles and leads in series.

F3 reads No. 3 traction motor fields and leads in series.

AA4 reads No. 4 traction motor armature, interpoles and leads in series.

FF4 reads No. 4 traction motor fields and leads in series.

A1 reads No. 1 traction motor armature, interpoles and leads in series.

FF1 reads No. 1 traction motor fields and leads in series.

The main generator Megger reading is taken at *CT*.

To isolate the armature from the interpoles of Lima road switchers and Baldwin switchers and Baldwin road switcher traction motors, open leads at the 9 o'clock brushholder, as shown in Fig. 7, and insulate each lead. This will isolate the interpole circuit from the armature and brushholders. Take Megger readings at brushholders and at interpole lead.

From the Diesel Maintainer's Note Book

Now You See It and Now You Don't

By Gordon Taylor

A GP-7 unit was reported as having repeated ground relay actions when it tied up at its home maintenance point. An inspection seemed to indicate that trouble was caused by moisture grounds in the high voltage system. The inspection also revealed that a hose in the engine cooling system had a loose clamp which permitted water to leak into the high voltage cabinet. Water had also run down on to one of the traction motors, which served to divert attention to the motor.

After the water leak was stopped, all wet equipment in the high voltage cabinet was carefully dried and the traction motor was dried out with heat lamps. A megger test indicated that insulation values had been corrected, so the unit was dispatched for service.

The unit operated about 10 miles when it was again in trouble with ground relay action. It was returned to the repair shop, and megger tests indicated a failure of the insulation in one of the No. 2 traction motor circuits.

The motor was isolated from the wiring system and was found to be in good condition. The ground condition appeared to be in the power cables leading back into the car body. The trouble appeared to be of the come and go type; that is, the insulation value revealed by the megger was not steady.

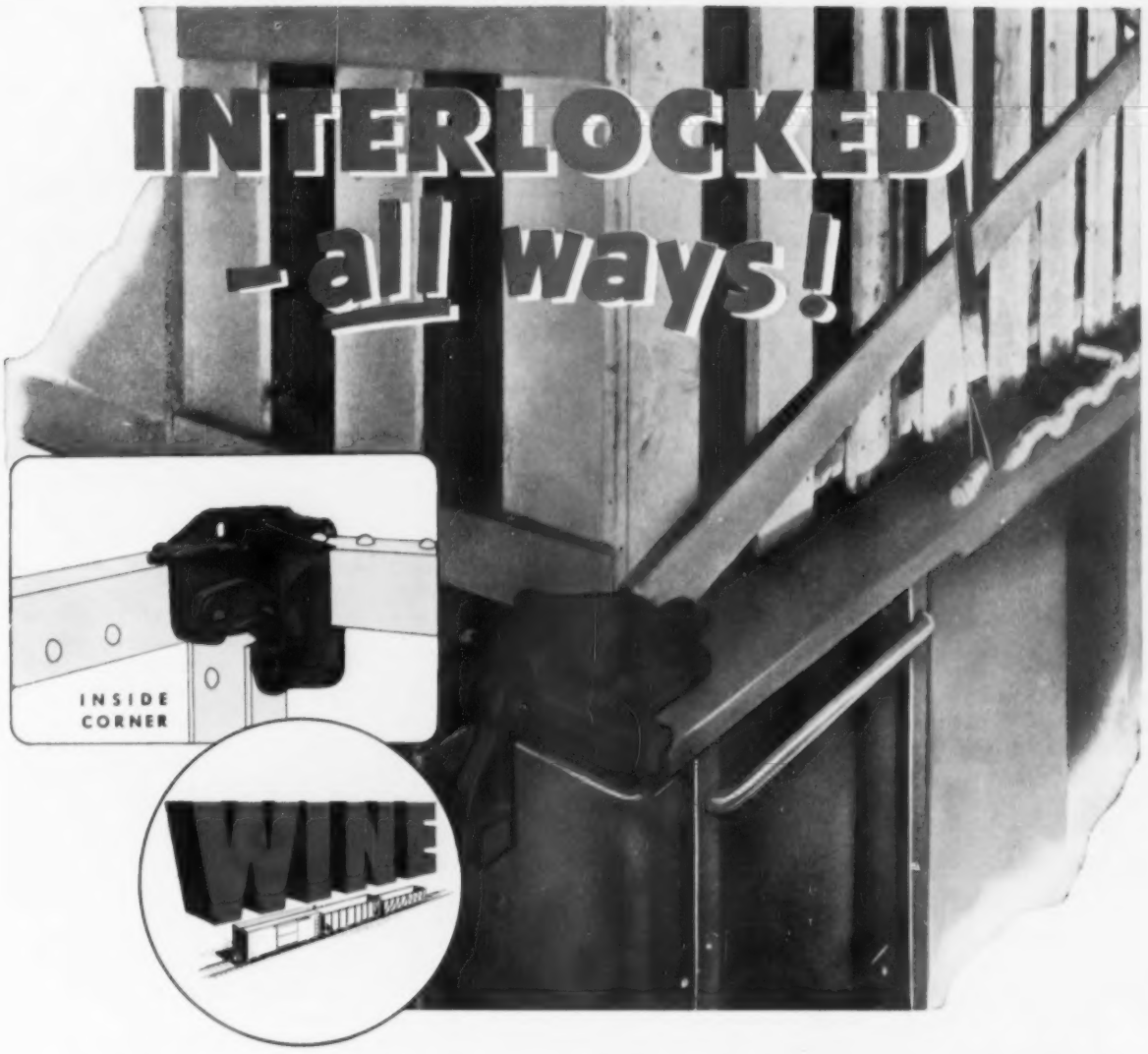
About that time one of our supervisors remembered that a similar elusive case of trouble was found to be due to a grounded condition of the load meter shunt, located in the high voltage cabinet. A prompt check of the ammeter shunt revealed that it was definitely grounded through its mounting base. When the shunt was disconnected from the No. 2 traction motor circuit, the ground disappeared and the megger test showed proper high resistance values.

When the shunt was removed from its fastening in the cabinet, it plainly showed that a water-soaked condition of the fibre base beneath the shunt base had provided a leakage path to ground. The fibre strip had a burned and charred condition. Apparently, the swinging ground action was caused by vibration which shifted the shunt from time to time, creating more or less favorable ground condition.

This case emphasizes the care that should be taken to guard against leaky water hoses and loose hose clamps. There are two hoses on a GP-7 unit located near the high voltage locker, which may, in some cases, water soak the interior of the high voltage cabinet.

Where such a water soaked condition occurs, it is necessary to carefully wipe dry and air out the cabinet. In drying out the apparatus in the cabinet it is necessary to dismount and carefully dry the fibre sheet beneath the load meter shunt to be certain it will not set up a leakage path.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



DROP END LOCKS

KEEP CORNERS FROM SPREADING · WON'T ACCIDENTLY OPEN

The Wine Drop End Lock has an unequalled record for continuous service with minimum maintenance. Progressive developments include the addition of a pry-bar opening to facilitate easier drop end closing, even when the car structure is distorted from hard service.

The 3-way interlocking feature assures positive closure and retains the end and sides in their original relative position by preventing the sides from spreading at the corners. Equipped with the Wine Drop End Balancer in combination, one man closure of the heaviest drop ends is safe, fast and economical.

THE WINE RAILWAY APPLIANCE CO. TOLEDO 9, OHIO

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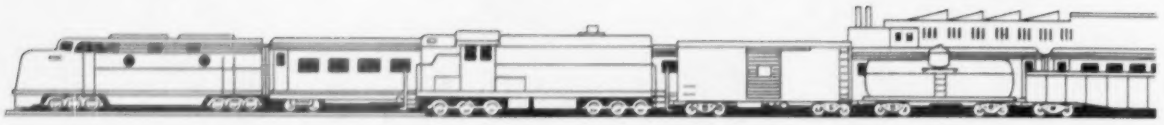
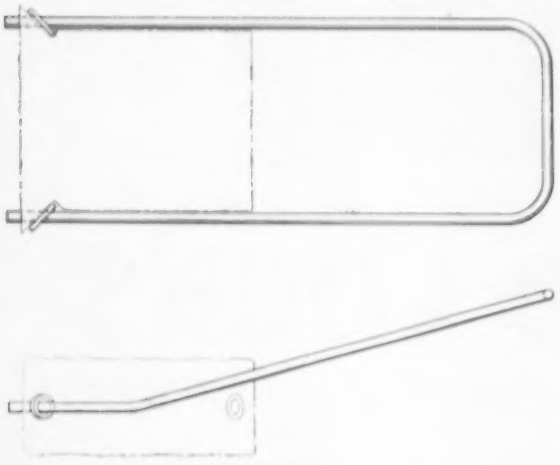


JOURNAL LUBRICATORS

Have any special tools been developed for installing the newly-developed journal lubricating devices, can the regular packing hook be of any use, or is this strictly a hand operation?

DESIGNS TOO VARIED—ONE TOOL CAN'T DO THEM ALL. Due to differences in design and the great number of lubricating devices, it is impossible to develop one tool which can be used to install all types. A number of specialized tools have been designed to apply individual models. One such, now in use, is the Redipaker for the Redipak lubricating pad. It is simply a piece of ⅜-in.



REDIPAKER

diameter rod bent into a U shape. The rod has washers brazed about 1-¼-in. from the two ends. The Redipak pad has four grommets, one at each corner of the pad. The tool ends are inserted through two adjacent grommets, the pad is placed at the journal box opening, and is pushed into place. While this device can be applied by hand, the use of the specialized tool cuts the operation down to about 30 sec per installation.

A number of lubricating devices are equipped with loops of metal or cloth, or with pull-rings to facilitate their removal. Jeffers, Miller, Redipak and Uni-Pak are examples of lubricators so equipped. These devices can be removed with a packing hook. Other lubricators require that the box be jacked and the bearing and wedge be taken out before the lubricator can be removed. After this operation is completed, a packing hook can be used to pull out most of these types of lubricators.

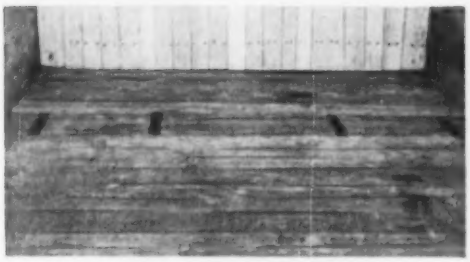
A TROUBLE FREE COMBINATION, *by Old LN Railroader.* Most of the recently developed journal lubricators can be applied without the use of special tools, and in most cases there is little reason to attempt to design such tooling because application by hand is so simple and speedy. Preparation for the application of some of these devices does require previous work.

The Empire journal lubricator, Hennessy journal lubricator, and National Motor Bearing sealed journal box kit all have free oil in the bottom of the box. For each of these devices, the conventional dust guard is not a satisfactory oil seal and each relies on a special oil seal design. To prevent crushing these seals, lateral must be restricted to about ¼-in. and the pre-war bearing and new axles make the most satisfactory arrangement. Preparation of the bearing for application of the Empire lubricator includes drilling two holes in each of the lugs. Springs that hold the lubricator rollers against the journal are hooked through these holes.

The Jeffers lubricator has a built-in seal to prevent oil being thrown out the back of the box. The general designs of the Miller lubricator and of the Cel-O-Pak achieve this same result. These three along with most of the other lubricators use the conventional dust guard and give satisfactory service. The box must be jacked to apply a number of these devices. Typical are the Chenille Roll packing and the Sockell Snug-Fit lubricators as well as the devices using mechanical arrangements—Empire, Hennessy and NMB.

While the applications of all these new devices do not require special tools, they do not completely solve the journal bearing problem. The lubricators and lubrication cannot solve the design problem of having the journal roll out from under the journal bearing under heavy braking or because of impact. When this occurs, the lining of the bearing can be damaged and subsequently can fail in service. The RS journal stop corrects the deficiencies of the original journal, bearing and box design by maintaining the alignment of the axle and bearing. At the same time the journal stops act as retainers for the lubricator. Now that a number of these lubricators have AAR approval for 36-month repack, the combination of journal stops and one of these devices should prove to be trouble free at minimum servicing cost.

Now...



BEFORE AFTER

UPGRADES ANY CAR INTERIOR TO MEET HIGH TARIFF LADING REQUIREMENTS

- **SMOOTH, TOUGH SURFACE—EASILY SWEPT OR WASHED OUT**
- **ADHERENT**—a mastic which bonds to surface. Not a strippable material
- **FLEXIBLE**—tough, but not brittle. ⅛" film will bend around 1" mandrel
- **SOLVENT RESISTANT**—unaffected by mineral spirits, water or gasoline. Wood color of film will not stain or discolor
- **NON-HAZARDOUS**—an oil-in-water emulsion. Presents no fire hazard in storage or application.
- **INSECT RESISTANT**—made of synthetic resin and mineral fillers—absolutely impervious to insects.

A PROTECTIVE COATING

FOR BOX CAR INTERIORS THAT LASTS INDEFINITELY

ARMORTEX

Here's really big news the whole railroad industry has been waiting for! Now, for the first time, it is possible to apply a quick, economical protective coating to box car floors and walls which insures the *permanent*, superior surface needed for shipment of high grade bulk commodities such as grits, flour, sugar and grain.

Armortex, an amazing new discovery of the J. W. Mortell Railroad Division, completely eliminates the costly preparation of cars for individual loadings. Internal car surfaces coated with Armortex no longer splinter or deteriorate under normal operating conditions . . . thus resulting in a reduction of claims due to leakage, infestations, package damage.

Still another big advantage of new Armortex is its ease of application. One man can cover a box car floor in less than 30 minutes . . . readying the car for service the next day. By spraying, brushing or troweling, Armortex can be applied at any shop, rip-track or siding without returning the car to a central maintenance location.

Write today for free illustrated booklet giving full details on Armortex

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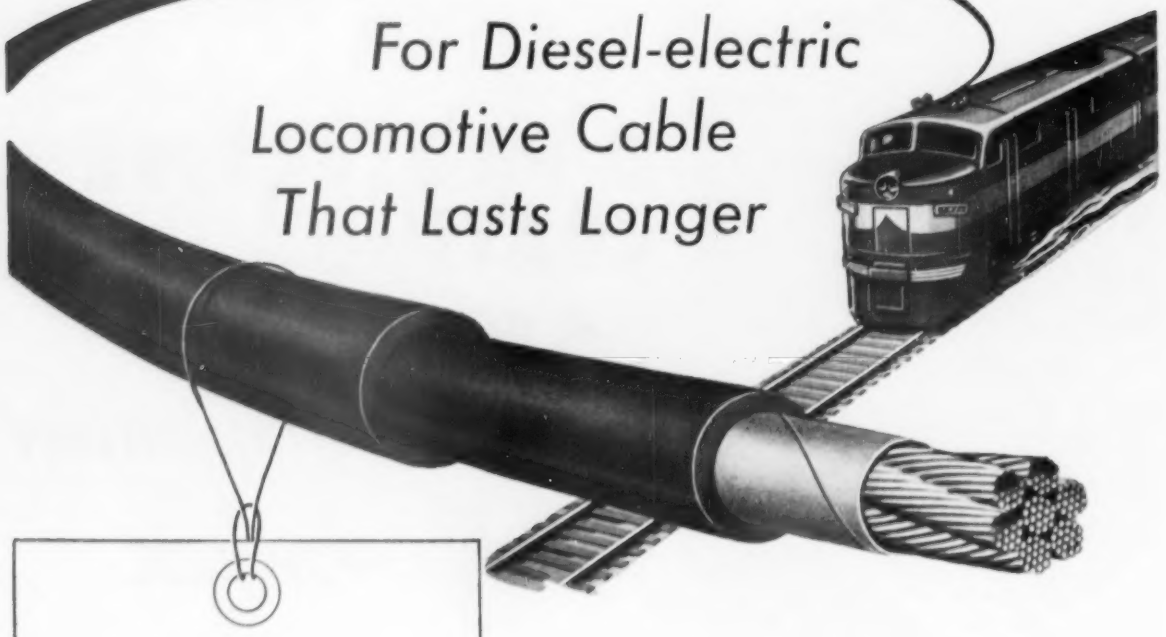
For Diesel-electric Locomotive Cable That Lasts Longer



G-E VERSATOL GEOPRENE resists—

- FLYING GRIT AND SAND
- OIL
- WATER
- CLEANING COMPOUNDS
- LIVE STEAM
- ICE DAMAGE

G-E Versatol* Geoprene* cable has a neoprene-base jacket that resists flying dust, grit, and sand. It withstands oil, water, cleaning compounds, live steam, and ice. The extra-flexible rope stranding is designed to stand up under continuous flexing.

Fine stranding makes this cable extremely easy to handle and to pull through conduit. Insulation strips cleanly. The carefully controlled diameter and concentricity of the cable provide a proper fit at all bushings and terminals.

G-E Versatol Geoprene cable is immediately available from stock in sizes No. 14 Awg and larger for power circuits (1000-volt rating); in sizes No. 16 and 14 Awg for control circuits (300-volt rating); and for general-purpose wiring. Control cable has rating printed on the surface for easy identification.

**Registered Trade-mark General Electric Company*

Technical Information available

Special high-temperature G-E cables are available for use in high-heat areas. For complete information, general purpose or special application, write for specification booklet "G-E Diesel-electric Locomotive Cables." Section W159-1147, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

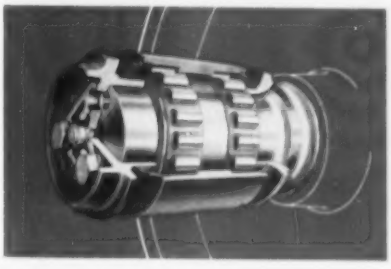
Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW HYATT HY-LOAD

Roller Bearing Journal Box For Freight Cars

Here is an entirely *new, simplified, dependable,* heavy duty roller bearing box for freight cars developed by HYATT with all the know-how amassed in building over 200,000 railroad roller bearings. It is *so economical* that railroads can now afford sweeping conversions that will save millions of dollars annually in costly inspection, lubrication and hot box delays.



Here's why: (1) **This one box fits both old and new cars.** It is easy to install on either integral or pedestal-type trucks. (2) **It comes with three-year lubricant supply sealed in.** The seals are *positive* —lube stays *in*, dirt and water stay *out*. (3) **Parts are interchangeable**—*fitting adjustments never are needed.* HYATT'S time-tested straight radial roller design assures these low-upkeep advantages *plus* maximum life and load capacity.

Right now—when old cars are being upgraded and new cars built to relieve the shortage—is the time to get rid of the hot box burden *for good!* No matter how "doctored", outmoded friction bearings are *false economy in the long run.*

The present freight car program is your golden opportunity to assure *far better and more profitable* freight service for years to come. Build *better* for the future with the *NEW running mate of faster freight.* Invest in HYATT HY-LOADS today.

GM GENERAL MOTORS

FOR FULL DETAILS CALL YOUR NEARBY HYATT SALES ENGINEER OR WRITE TODAY FOR LITERATURE

HYATT

RUNNING MATE OF FASTER FREIGHT

HYATT BEARINGS DIVISION OF GENERAL MOTORS, HARRISON, N.J.

FACTS ABOUT Exide®

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KEEPS MORE PASSENGERS COMFORTABLE-AND COOL!

FOR NEW HIGH-REVENUE PRODUCERS LIKE THIS BUDD-BUILT SANTA FE 85-PASSENGER CHAIR CAR, EXIDE RESEARCH HAS DEVELOPED A NEW HIGH-CAPACITY CAR LIGHTING AND AIR CONDITIONING BATTERY—THE EH EXIDE-IRONCLAD! NEW ALLOYS, NEW PLASTICS, NEW BATTERY ENGINEERING GIVE YOU FULL RATED POWER INITIALLY—FULL RATED POWER FOR A LONGER WORKING LIFE. IRONCLADS COST LESS TO OWN, OPERATE AND MAINTAIN—THEY ARE YOUR BEST POWER BUY—

AT ANY PRICE!

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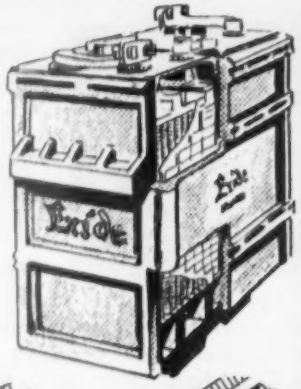
- ITS UNIFORM QUALITY ASSURES SUSTAINED HIGH CAPACITY DURING LONGER USEFUL LIFE!



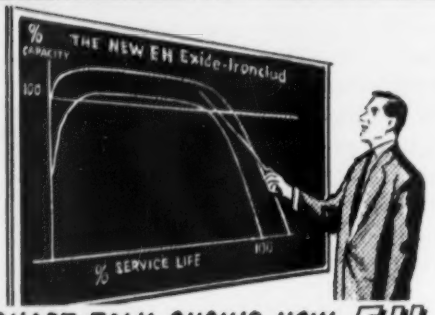
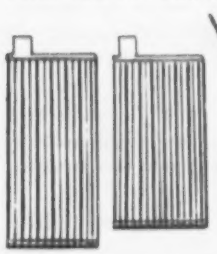


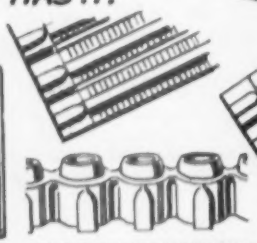
CHART TALK SHOWS HOW EH HIGH CAPACITY MEANS LONGER LIFE!

THE NEW EH STARTS OFF STRONGER...DELIVERS 100% CAPACITY INITIALLY. SEE HOW THIS HIGH CAPACITY IS SUSTAINED DURING A LONGER USEFUL SERVICE LIFE. AN IRONCLAD'S SUPERIOR WORRY-FREE PERFORMANCE MEANS BRIGHT LIGHTS EVEN DURING LONG STOPS... UTMOST DEPENDABLE OPERATION OF AIR CONDITIONING EQUIPMENT... WITH THE LOWEST POSSIBLE OVERALL COSTS!

THE NEW EH HAS...



10% LONGER PLATES IN THE SAME PLACE YOU GET MORE POWER FOR A LONGER TIME!



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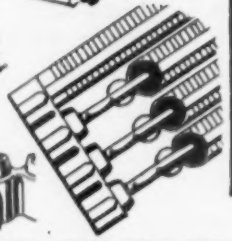
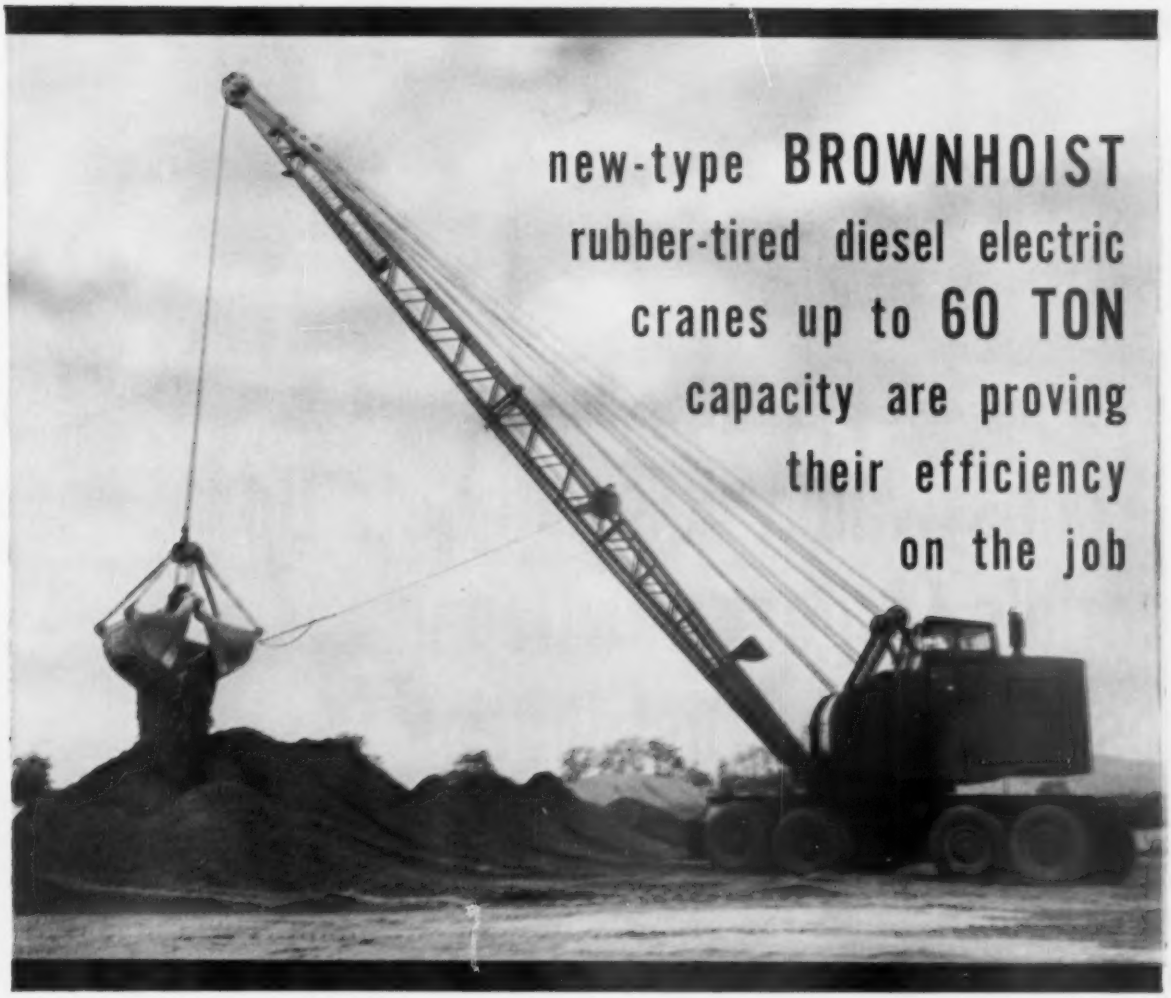


GRIDS WITH SILVIUM THIS NEW EXIDE NON-CORROSIVE ALLOY GIVES HIGH SUSTAINED POWER...LONGER LIFE!

WRITE NOW, CALL YOUR EXIDE SALES OFFICE FOR SPECIFICATIONS OF THE NEW EH. *TEST* IT YOURSELF. YOU'LL FIND THE NEW EH EXIDE-IRONCLAD IS YOUR BEST POWER BUY —*AT ANY PRICE!*

Exide INDUSTRIAL DIVISION. The Electric Storage Battery Company, Philadelphia 2, Pa.



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BROWNHOIST MATERIAL HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

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BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, Denver, San Francisco, Montreal • AGENCIES: Detroit, Birmingham, Houston

The new Brownhoist Wagon-Cranes are specifically designed to do an outstanding job wherever high mobility and high capacity are required. You'll see them at work performing heavy duty jobs in mines, quarries, steel mills, for railroad and lumber operations and for many other large industries. Equipped with dynamatic clutch, anti-friction bearings at all essential points, power steering, electric travel and electric rotation. Mounted on a 12 wheel crane carrier capable of speeds up to 8 miles per hour, the unit can be operated by one man from easy-to-reach controls. Economical to operate. Available in capacities from 25 to 60 tons. For specification folder or further details, get in touch with our nearest representative or write us at Bay City.

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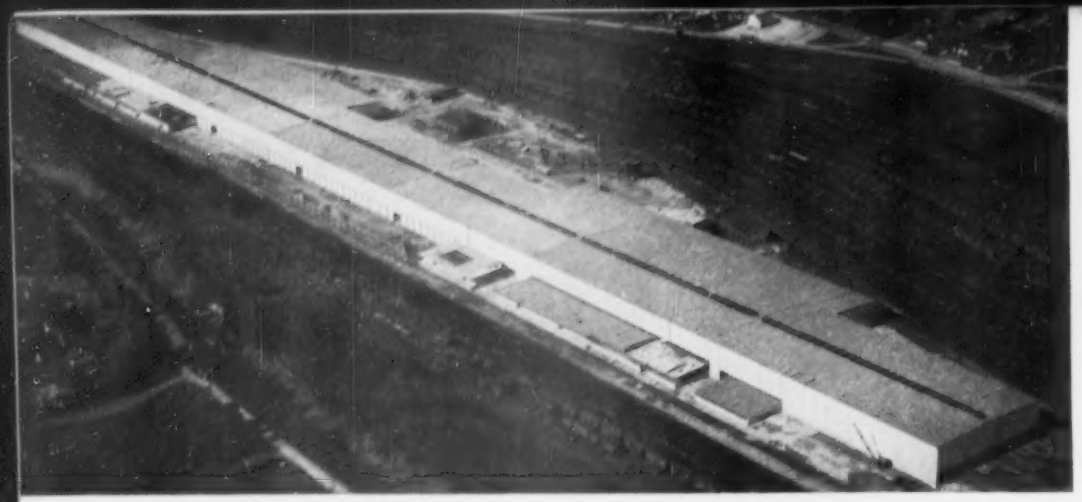


NEW, HALF-MILE LONG freight car repair shop—viewed from the air—looks like the deck of a super aircraft carrier. Named for the Pennsylvania Railroad's ninth president, the "Samuel Rea" will combine all repair operations under one roof.

TO HELP EASE THE SHORTAGE OF ROLLING STOCK

Pennsylvania Railroad Sets Up World's Largest Car Repair Shop, Uses G-E Power Distribution System

To help solve the present freight car shortage by getting more cars back on the road quicker, the Pennsylvania Railroad has invested in the newest and largest freight car repair shop in the world—the half-mile long "Samuel Rea" repair shop at Hollidaysburg, Pa. This new installation, which will be pressed into full service late next Spring, consolidates the repair work now being performed by the Pennsylvania at 12 different locations around the railroad. By combining repair operations under one roof and using production line methods of work, this giant four-track, steel-frame structure will have an initial capacity for rebuilding 50 cars of all classes a day. Later, by working added shifts, the capacity will be increased to 80 cars or better.

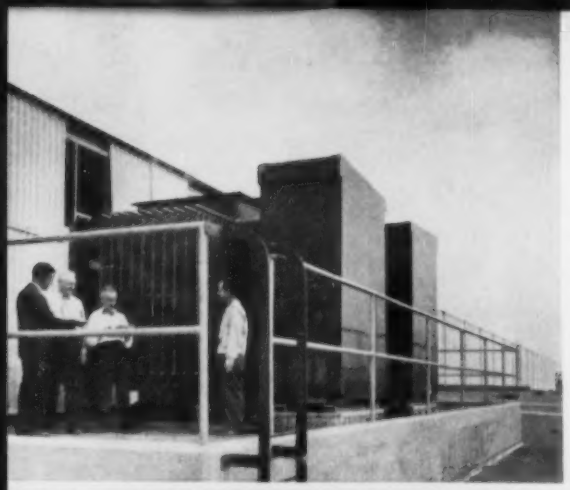
For adequate distribution of power and to protect the electrical circuits in this new and important facility, up-to-date G-E electric equipment has been installed at strategic locations throughout the huge shop. Among the General Electric equipment included in the plant's power distribution system are five outdoor substations totalling 14,000 KVA transformer capacities (together with the associated switchgear); metal-clad incoming-line switchgear units; and some 2200 KVA of dry-type transformers.

General Electric, world's largest manufacturer of electrical apparatus, has a complete line of power distribution equipment that can be tailored to fit the requirements of *any* railroad installation—*large or small*. For further information on G-E power distribution systems, call your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 152-58A

Progress Is Our Most Important Product

GENERAL ELECTRIC

WORKING CLOSELY TOGETHER, railroad officials, electrical contractor and G-E representatives planned shop's electrical system. Shown here are (l. to r.) C. J. Henry, Chief Engineer—Eastern Region, Pennsylvania R.R.; W. S. O'Sullivan, G-E switchgear specialist; W. R. Govett, Vice President and Chief Engineer, Harry F. Ortlip Co.; R. E. Nopper, G-E transportation sales engineer; and H. M. Wood, Assistant Chief of Motive Power—Cars, Pennsylvania R.R.



COMPACT G-E UNIT SUBSTATION, one of five installed at world's largest freight car repair shop, is double-ended with 1500 KVA of transformer at each end.

MODERN G-E METAL-CLAD SWITCHGEAR equipment in main switching station provides control and protection of the incoming power line. This type of equipment offers highest safety for personnel.

INSIDE SWITCHGEAR ROOM of G-E substation, low-voltage drawout circuit breakers are easily inspected. Breakers fit in sturdy metal compartments as shown below.

HEAVY REPAIR WORK on cars of all classes will be performed once the huge shop is readied for full operation. At present, only minor repairs are being carried out. Above, repairmen work on underside of a gondola car. In top center of photo, two G-E dry-type single-phase transformers feed power to overhead fluorescent lights.

don't remove the M-F threshold plate to replace one board!*

Floorboards do not pass under the M-F Threshold Plate—one or more boards in the doorway may be replaced *without removing the Threshold Plate.*

MAC LEAN-FOGG
Lock Nut Company

LOCK NUTS • WATERTIGHT BOLTS • SPECIAL BOLTS • FLOOR CLIPS • STAMPINGS
STANDARD NUTS • THUMB SCREWS • TOOLS • DIES • PRESSED METAL PRODUCTS

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In Canada:
THE HOLDEN CO., LTD., MONTREAL

* *You can't remove it—it's a permanent, structural member of the car.*

SUPPLY TRADE NOTES

(Continued from page 19)

has been appointed technical director, reinforced plastics division.

■

F. H. Williams

SKF INDUSTRIES.—*F. H. Williams*, who has been engaged in engineering sales activities with SKF, has been appointed manager of its railway department, at Philadelphia. *Phillip A. Carlson* has been appointed regional manager of its newly created midwestern sales region.

■

L. F. Williams

COOPER-BESSEMER CORPORATION. —*Lawrence F. Williams* has been elected president, succeeding *Gordon Lefebvre*, who has resigned because of his health.

■

JOSEPH J. RYERSON & SON, INC.—*Henry B. Williams*, sales manager of tubular steel products and cold finished steel bars, has been named manager of sales, New York area. *Robert A. Daggit*, field representative, has been appointed assistant sales manager for the Chicago plant.

■

YOUNGSTOWN SHEET & METAL TUBE CO.—*William E. Fowler* and *Herman J. Spoerer* have been elected vice-presidents.

PULLMAN-STANDARD CAR MANUFACTURING COMPANY. — Pullman-Standard has begun the first phase of a multi-million dollar expansion and improvement program at its freight-car plant in Bessemer, Ala. This phase of the program, scheduled for completion by next April 30, will add 100,000 sq ft of buildings to the existing facilities at a cost of $1,000,000 and will increase production capacity by 1,500 to 2,000 freight cars annually, according to C. W. Bryan, Jr., president.

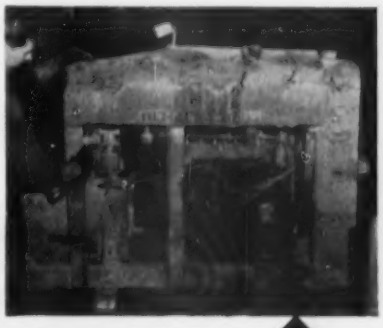
Obituary

DR. JOSEPH B. ENNIS, retired senior vice-president of the American Locomotive Company, died at Paterson, N. J., on September 22, at the age of 76. Mr. Ennis began his career in 1895 as a draftsman for the Rogers Locomotive Works in Paterson and later worked on general locomotive designs for the Schenectady Locomotive Works, returning to Rogers in 1902. He handled designs and calculation-specifications for Alco from 1902 to 1906 and was subsequently assistant to the mechanical engineer, design engineer, chief mechanical engineer, vice president of engineering, and senior vice-president. Mr. Ennis was also a president of the Steam Locomotive Research Institute.

"LINCONDITIONING"

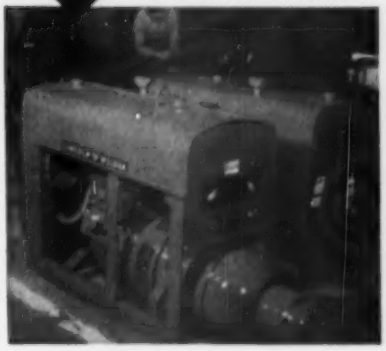
LINCOLN FACTORY REBUILDING

provides new welder performance from your old machines *AT LOW PRICE!*



BEFORE "LINCONDITIONING"

AFTER "LINCONDITIONING"



GUARANTEED PERFORMANCE

- New machine guarantee goes with every remanufactured welder

LOW COST

- Cost of "Linconditioning" is less than half the price of a new machine.

PRECISION REPLACEMENT PARTS

- All parts are reconditioned and returned to new product standards or are replaced with new parts.

MORE INFORMATION

Learn how "Linconditioning" can cut your repair and replacement costs. Details in Bulletin 4606. Write on your letterhead to The Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio. Railroad representatives of

THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

3 Reasons why...

G.E.'s traction system gives you maximum locomotive performance

1—HIGHER CONTINUOUS TRACTIVE EFFORT

In day-to-day operations, locomotives equipped with G-E traction motors consistently prove their capacity for carrying heavier loads. That's because the GE-752 motor has 15 percent higher continuous tractive effort, at comparable gearings, than any other motor in railroad use. This extra capacity accounts in large measure for its record of low maintenance costs and low percentage of failures—two important factors in lowering operating costs.

2—FEWER LOCOMOTIVE ROAD FAILURES

Although flashovers occur on all locomotives, road failures due to generator flashover are practically unknown on locomotives equipped with G-E traction generators. In actual tests, one G-E generator took over 400 flashovers without failure. Features that assure low flashover damage include: inherently high machine stability; mycalex brush-holder insulators which unlike the porcelain insulators in other generators will not shatter during flashover; and, a brush-holder shield that drastically reduces damage to the brush rigging.

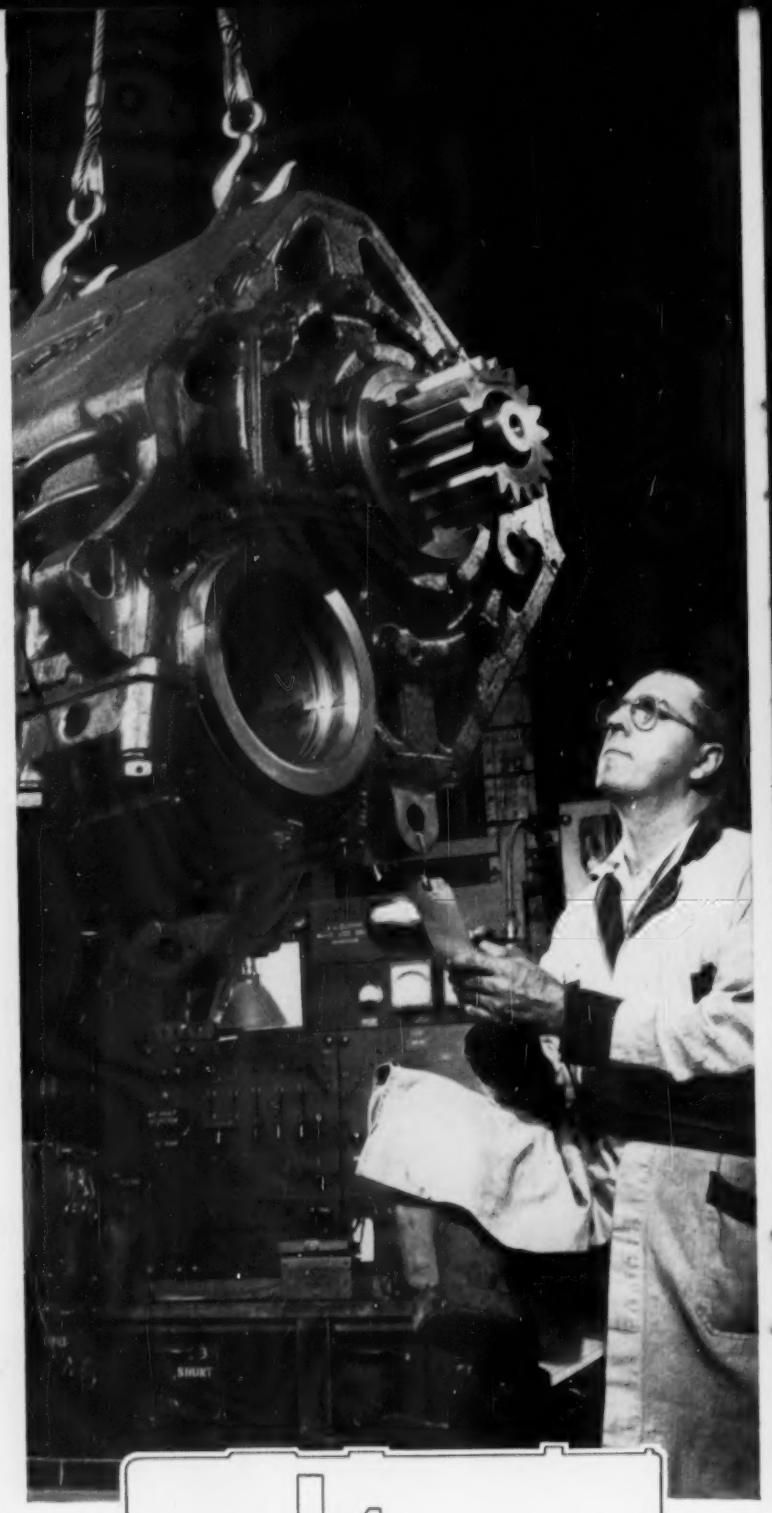
3—MINIMUM MAINTENANCE REQUIREMENTS

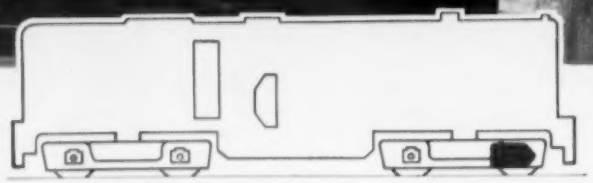
One of the chief benefits that any locomotive control system can provide is reliability. It is important to reduce or eliminate those small, continuing and aggravating maintenance problems that occur on some control systems. In actual tests, G-E control has operated hundreds of thousands of miles in heavy mainline service with complete reliability.

Ask your G-E Apparatus Sales representative for more information about the General Electric traction system—the system that sets the industry standard. Or write Section 115-8A, Locomotive and Car Equipment Department, Erie, Pa.

Progress Is Our Most Important Product

GENERAL ELECTRIC

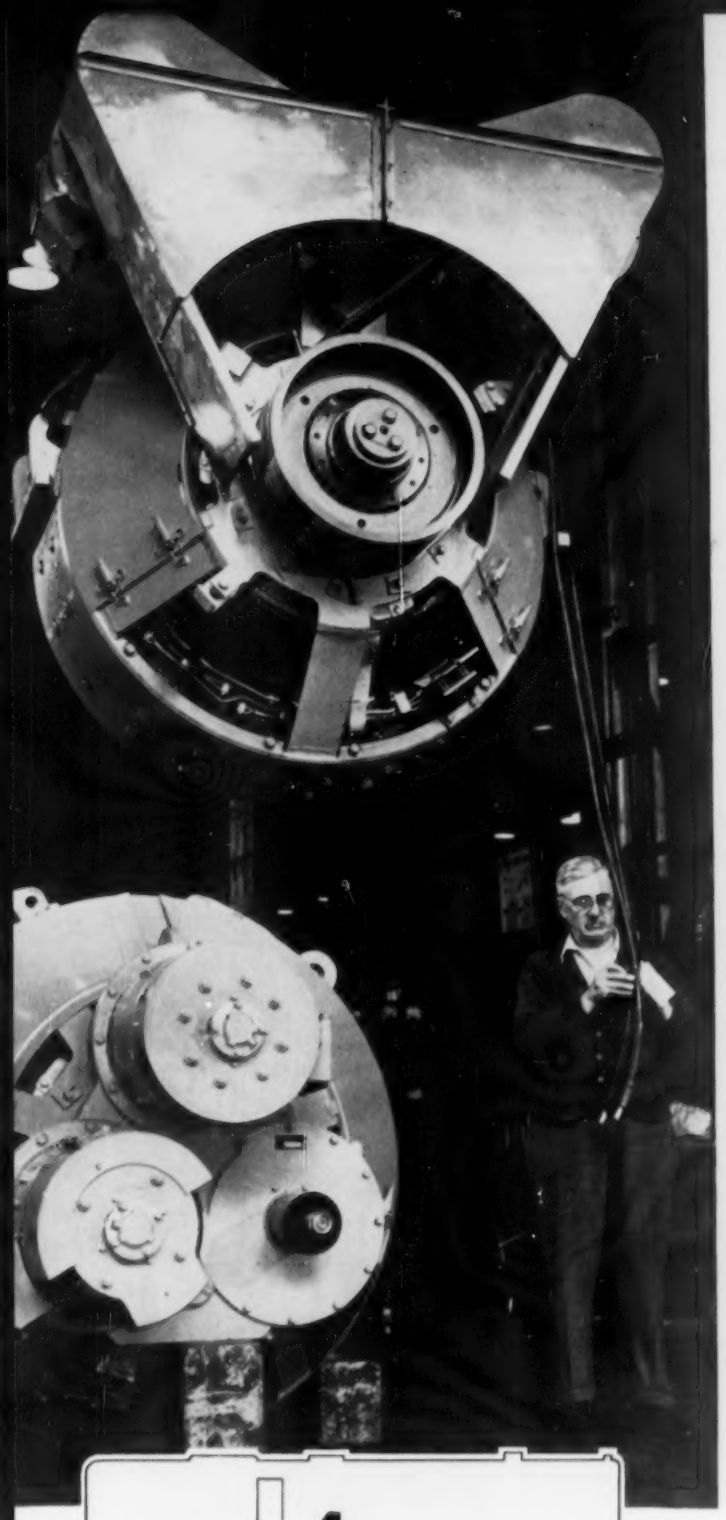


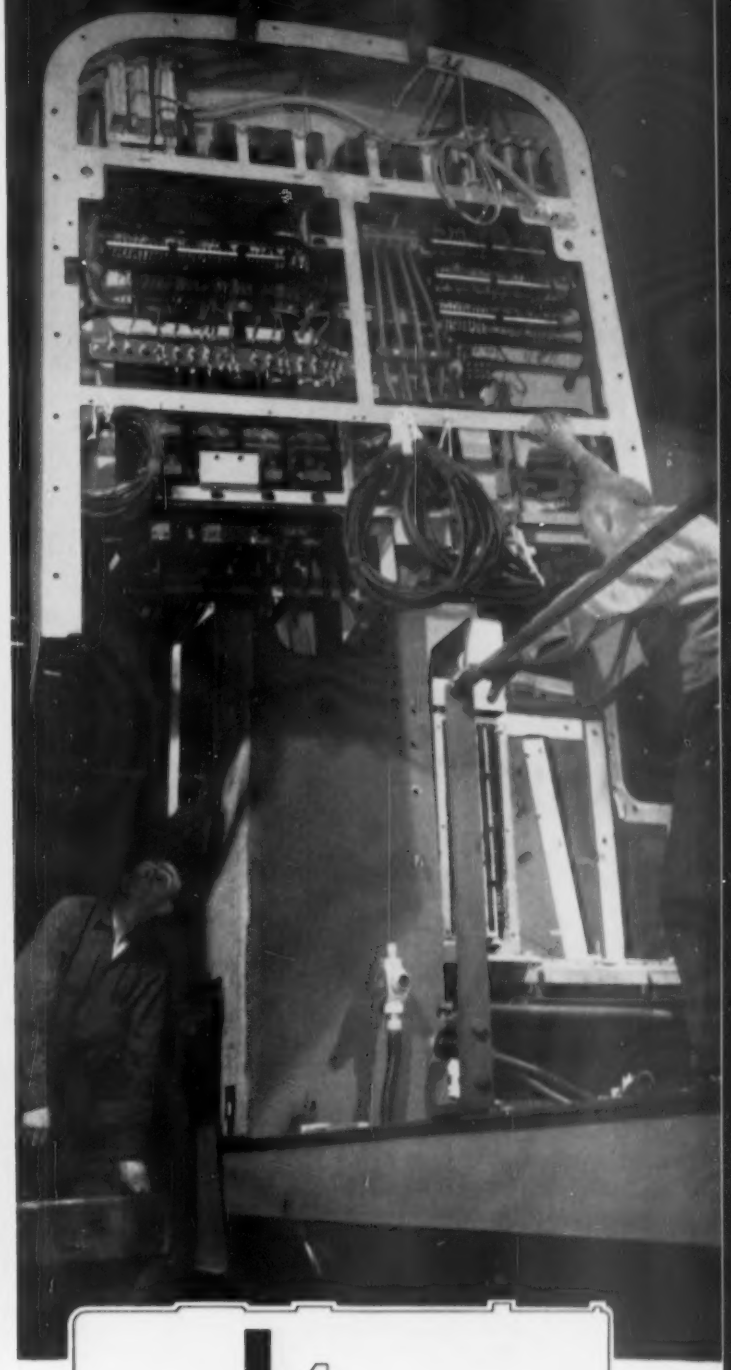


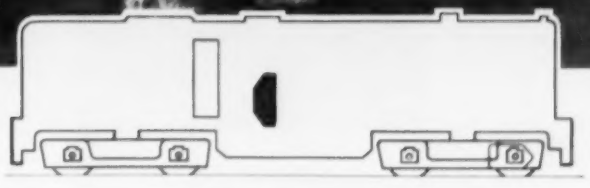
1 G-E TRACTION MOTORS GIVE YOU 15% HIGHER CONTINUOUS TRACTIVE EFFORT

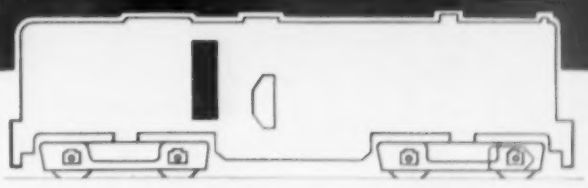
More working material in the GE-752 motor (12 percent heavier than any other motor offered for standard application) means higher ratings. The effective use of additional active copper and iron results in the most powerful traction motor available today.

GENERAL ELECTRIC









2 G-E TRACTION GENERATORS ARE BUILT TO REDUCE LOCOMOTIVE ROAD FAILURES

Because they are designed specifically to take flashovers in stride, G-E traction generators help protect your locomotive from frequent and costly road failures. In most cases, if a G-E generator flashes over, it simply recovers and the locomotive continues its run.

3 G-E CONTROL REQUIRES MINIMUM MAINTENANCE BETWEEN ANNUAL INSPECTIONS

G-E control is simple in construction, with fewer moving parts than other systems. In actual railroad service, locomotives equipped with G-E control have operated from annual inspection to annual inspection without a single detention being charged to the control system.

Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on coupon below to receive desired information. Requests will be forwarded direct by the manufacturers.

1. ELECTRONICS PRODUCTS. *Allied Radio Corp.* 324-page catalog #150 (1956 Buying Guide) "Everything in Electronics From One Dependable Source, Allied Radio" lists over 26,000 items, with special emphasis placed on equipment for railroad maintenance, research and production requirements.

2. HOT BOXES. *National Bearing Div., American Brake Shoe Co.* 16-page profusely illustrated folder (H-111) "In Action Against The Hot Box" is a progress report on American Brake Shoe's journal bearing Research Laboratory's activities; includes description of the new Redipak lubricating pad developed there.

3. DIESEL ENGINES. *Caterpillar Tractor Co.* 2-color 8-page broadside (717-31554) "Caterpiller Announces Two New Additions to its Engine Family" describes, illustrates and gives specifications on the D342 and D339 heavy duty diesel engines; photos show typical uses.

4. DRY FLUID DRIVE. *Dodge Mfg. Co.* 4-color 12-page bulletin (A-640) "Flexidyne The Dry Fluid Drive" contains full color illustrations, cross section engineering drawings, and shows two methods of selection with easy to use selection charts; includes list prices on all units.

5. SILICONE-RUBBER INSULATION. *Allis-Chalmers Mfg. Co.* 4-page 2-color 3-hole punched reprint-leaflet "Silco-Flex Insulation, Opening the Way to Longer Motor Life" (05R8341) describes and illustrates "Silco-Flex" all-silicone-rubber insulating system for motor and generator stator windings.

6. WAY & SURFACE GRINDERS. *Mattison Machine Works.* 8-page 2-color pull-out booklet tells the story of the new Combination Way and Surface Grinder; describes unique three-column box-type construction.

7. HYDRAULIC VISE. *Columbian Vise & Mfg. Co.* 2-color illustrated bulletin (LL-2029) describes, illustrates and gives complete specifications on the No. 1004 Columbian hydraulic vise; photos show how unit is controlled by 2 simple foot pedals.

8. FLEXIBLE METAL HOSE. *Atlantic Metal Hose Co.* Bulletin (20-E) describes and illustrates corrugated metal hose of annular and hiljcal construction; includes complete engineering data on bending radii, bursting pressures and weights.

9. WIRES AND CABLES. *Rockbestos Products Corp.* 8-page booklet (RSS #88) "Specifications For Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wires and Power Cables" establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 volt ratings.

10. NUMBERS & LETTERS. *W. H. Brady Company.* 6-page 3-color bulletin (165) "Self-Sticking, All-Purpose Numbers and Letters" for marking bays, bins, columns, posts, barrels, shipping containers, machines and any other equipment in the office, shop or on the road, for identification, safety and maintenance; prices and free usable samples included.

11. PACKAGE DRIVES. *Allis-Chalmers Mfg. Co.* 8-page 2-color 3-hole punched bulletin (51B8166) "New Package Drives for Precise, Wide Range Variable Speed Control" for applications requiring accurately variable speed over a wide range.

12. CHROMALLIZING. *Chromalloy Corp.* 4-page reprint "Chromizing Improves Surface Properties of Steels" describes process for increasing heat, wear and corrosion resistance of ferrous metals by diffusing chromium into the surface at high temperatures.

13. PYROMETERS. *Barber-Colman Co.* 12-page 3-hole punched loose-leaf bulletin (F 7259) "Service Tips—Pyrometer Controllers" covers what to do if instrument reads erratic, instrument temperature curve off, instrument reading too high (or too low), and instrument controls erratically.

14. SCREW MACHINE PRODUCTS. *Abbott Products Inc.* 4-page brochure "Abbott For Precision, Quality, Service" describes, illustrates and diagrams some of the precision parts, specials and standard stock items; six items are shown in detail.

15. PUNCH & DIE. *Whitney Metal Tool Co.* 16-page "Punch & Die Catalog" (P&D) describes and illustrates the complete and diversified line of punches and dies, organized in sections by maximum hole sizes for various standardized types of punches.

16. CLEANING EQUIPMENT. *Acoustica Associates, Inc.* New bulletin (DR-400) describes and illustrates Acoustica Model DR-400 Ultrasonic Cleaning Equipment for production cleaning and degreasing of precision products; includes specifications and photo of the unit.

Reader Service Department — NOVEMBER, 1955
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

Please send literature circled below:

1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16

Also, please send me additional product information as follows: (company, product & page number) .....

Name ..... Title or Position .....

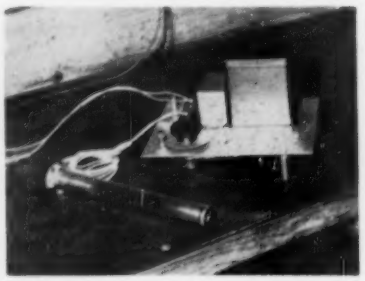
Company .....

Address .....

City ..... Zone ..... State .....

NEW DEVICES

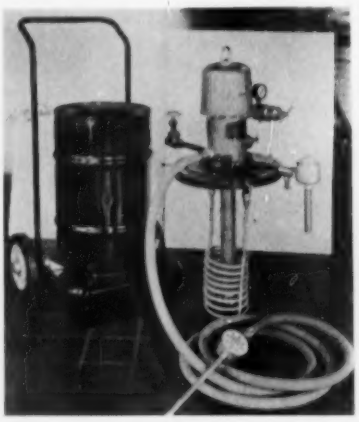
(Continued from page 6)



Refrigerator Car Temperature Control

A temperature control for refrigerator cars has been developed which uses a magnetic amplifier instead of electronic tubes and as a result is claimed to better stand the jolt and vibration of railroad use. This control has an adjustable temperature setting which can be changed from minus 10 to plus 70 deg F by turning one knob on the panel. Its control can be applied to different types of mechanical cooling and heating systems.

The temperature sensing element installed in a cooling air duct is a Vapor Thermistor thermostat in a brass tube. The element is sensitive to 0.1 deg temperature changes. The magnetic amplifier enlarges the small electrical signal from the thermistor to control the cooling or heating equipment. The control panel can be fitted into the refrigeration control panel and requires 220 a-c for operation *Vapor Heating Corporation, 80 East Jackson boulevard, Chicago.*



Traction Gear Lubricator

Furnished with an air-operated pump and steam coil heating unit, this outfit can be utilized to dispense lubrication greases to the traction gears of diesel-electric locomotives. The pump with its steam coil works

(Continued on page 94)

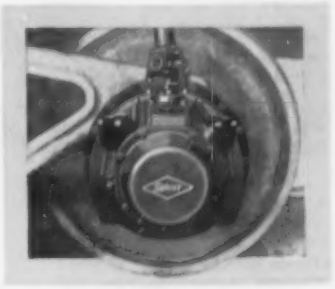
Photo—courtesy of Erie Railroad

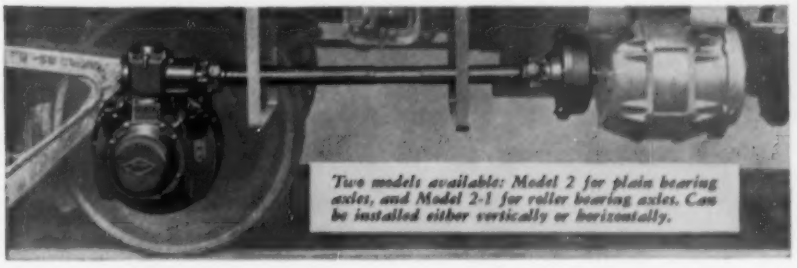
and with a 25-mile radius of track operations through 2-way radio powered by Spicer Generator Drives!

The conductor with 2-way radio has at his command an instantaneous "round-up" of the operating news and conditions on his train . . . *whenever* he needs it . . . *wherever* he needs it.

Mechanical troubles are remedied more quickly. Delays and tie-ups are minimized. Cargo damage or spoilage is reduced. Trains can't get "lost." Changes in train orders can be given en route, with better dispatch and efficiency. A greater measure of safety for train and crew is assured day and night. And operating situations for all trains in a 25-mile radius can be inter-communicated for the benefit of all.

Write for illustrated bulletin No. 323 giving complete details of the new, small ½ to 5 KW Spicer Positive Generator Drive for low-cost adaptation to caboose, baggage, mail and refrigerator cars.





Two models available: Model 2 for plain bearing axles, and Model 2-1 for roller bearing axles. Can be installed either vertically or horizontally.

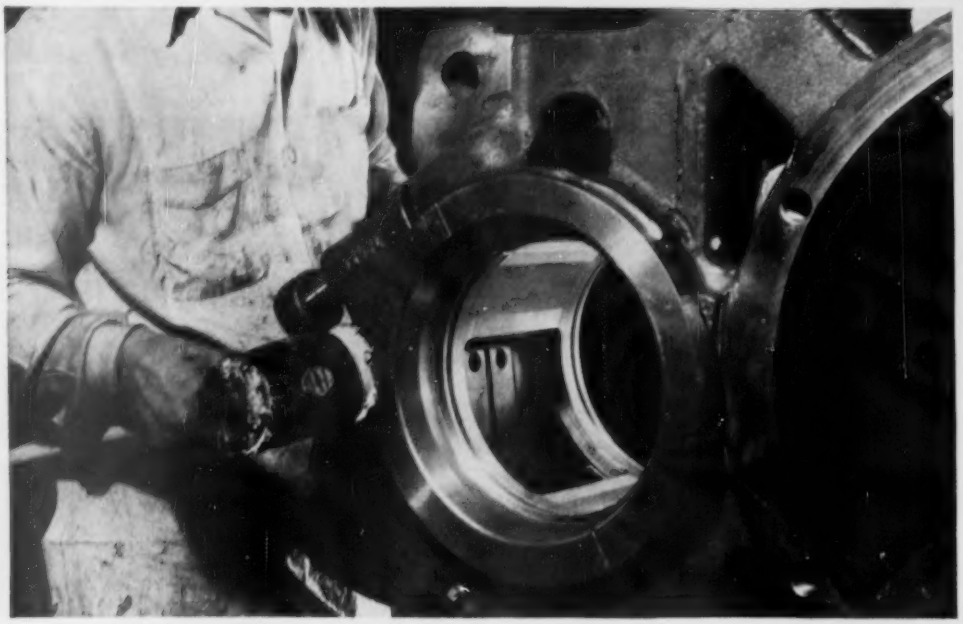
Spicer

DANA CORPORATION

Toledo 1, Ohio

7 G-E replacement parts for better locomotive operation

1. G-E MOTOR SUSPENSION BEARINGS with *oil-return* grooves can save you up to $85.00 for each locomotive unit annually.



How G-E Motor Suspension Bearings Give Long Life, Low Maintenance Costs

With General Electric's ***oil-return*** traction-motor suspension bearings, a passenger unit, averaging 20,000 miles per month, is capable of reducing oil consumption approximately 220 gallons per year. It's accomplished by ***oil-return*** grooves cut into the bore at each end of the bearing. Through these grooves excess lubricating oil is ***returned*** to the axle-cap—not onto the roadbed.

In addition, G-E suspension bearings are ideal for high-speed railroad service. Their special alloy composition resists breakage and wear under today's tough operating conditions. Their rigid construction, which helps keep them tight in the axle-caps, means still less wear on bearings and traction-motor gearing.

To get the performance you originally bought, always specify genuine General Electric traction-motor suspension bearings—the bearings that are designed as an integral part of your G-E traction motor. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa. 128-23

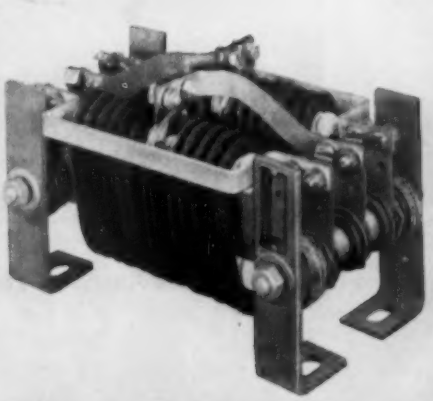
Progress Is Our Most Important Product

GENERAL ELECTRIC

2. G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces of your unit.

3. G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's heavy railroad service.

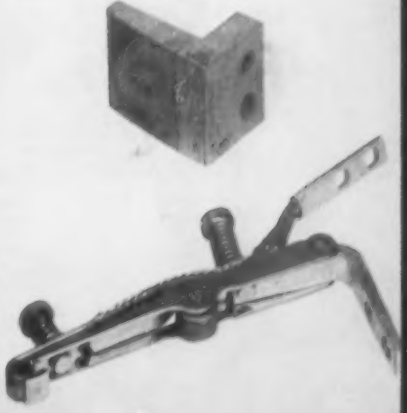
4. G-E RESISTORS have floating steel backbones that expand and contract freely with high temperature changes and therefore are not subject to harmful buckling forces.



5. G-E COMMUTATORS retain smoothness in rigorous service because high-speed, high-temperature seasoning process sets segments firmly in place, cuts down friction wear and tear.

6. G-E ARMATURE COILS are available as part of complete rewind kits for your convenience. Every coil is dimensionally accurate and quality insulated for longer life.

7. G-E CONTACT PARTS break circuits quickly with a minimum metal transfer. This assures you of long service life from these parts.



INDUSTRIAL HOSE AND FITTINGS

Super resistance to abrasion and corrosion makes this hose excellent for railroads, road equipment, farm machinery, and materials handling equipment. High tensile strength single wire braid. Tough synthetic rubber cover. Working pressures to 2500 psi. Bulk hose and fittings . . . complete hose assemblies at your dealer.

Write for BULLETIN
Dealerships open in some areas.

STRATOFLEX

STRATOFLEX, INC. FORT WORTH, TEXAS
P. O. BOX 10398

BRANCH PLANTS
LOS ANGELES AND TORONTO
SALES OFFICES
ATLANTA • CHICAGO • NEW YORK • SAN FRANCISCO
DAYTON • HOUSTON • KANSAS CITY • PORTLAND • TULSA
IN CANADA
STRATOFLEX OF CANADA, INC. TORONTO 18, ONTARIO

(Continued from page 90)

inside the original drum of grease and enables the operator to supply any required amount of lubricant.

With lubricant temperature of 140 deg F, the unit will furnish 16 lb of grease per min. Lubricant heat-up time depends upon starting temperature.

The outfit includes an 8-1 ratio air-operated pump, 100 lb. drum size; drum cover with port; two-wheeled drum truck; steam coil with shut-off valve and water trap; 15 ft of ¾ in. inside diameter material hose; meter and control valve and long nozzle; and a 60 mesh air-supply screen. *Graco Railway Department, Gray Company, Inc., Graco Square, Minneapolis 13.*

Flange Lubricating Compound and Applicator

Increase in service life of diesel locomotive wheels is claimed for the Transall 3-B compound for lubricating flanges. A compound applicator, Model RD-2, is made to apply the stick compound to flanges. This applicator is spring loaded and is guided by a wheel running on the flange. This wheel rolls on a pre-lubricated sealed ball bearing. The applicator is mounted to the truck frame with a universal bracket. The cap of the applicator is removed for refilling.

The 3-B compound is made of a variety of greaseless, non-friction materials heated together and cast into sticks. It is said to remain only where applied and does not creep onto the wheel tread. *Transall, Inc., Railway Division, P. O. Box 1588, Birmingham 4, Ala.*

Powder-Actuated Stud Driver

The model 455 driver, has interchangeable barrels which permit use of a number of different power loads that deliver impacts of varying force. Each load is designed for proper penetration in structural materials when used with alloy steel studs of specific diameters, lengths and purposes. It accommodates 25 types of ¼ in. studs ranging in length from 1 to 3¼ in., or 12 types of ⅜ in. studs of lengths from 1½ to 4¾ in.

The tool is constructed of polished aluminum and hardened steel. By adjustment of a set screw, the driver can be regulated for two-handed operations. The tool is inoperable if it is inclined more than a minimum safe limit or angle to

for greater
RAILROAD
MAINTENANCE
SERVICE

FINE ORGANICS offers
2 EMULSION CLEANERS
that excel in

- ✓ SOLVENCY
- ✓ DETERGENCY
- ✓ DIRT PENETRATION
- ✓ EASE OF RINSING
- ✓ NON STREAKING
- ✓ NON STAINING

F.O.-106

Specifically designed for exterior car cleaning . . . the degreasing and cleaning of mechanical parts, motive equipment, engines, engine pits, shop floors.

F.O.-116

Made to fulfill the need for a heavy duty cleaner and degreaser. Used for rugged jobs, under carriages and exteriors, running gear and surfaces — and areas subject to heavy oil, asphalt and other tenacious accumulations.

The superior solvency of these two emulsion cleaners . . . the effective dirt penetration and easy rinsability cuts cleaning costs and saves valuable personnel time

also available F.O.-162 and F.O.-102 Carbon Removers

F.O.-128 and F.O.-101 'Safe-tee' Solvents

Write to Dept. '3'. for complete information

FINE ORGANICS, Inc.
211 East 19th St. · New York 3, N. Y.

a smooth work surface. It cocks only when depressed against the work. As soon as pressure is released, the tool uncocks.

A power guide disc attachment on studs serves as a guide for straight driving and seals gases behind the stud for consistent penetration. *Remington Arms Company, Bridgeport, Conn.*

First Certified Short Pocket Draft Gear

The first short-pocket draft gear to be completely tested under Association of American Railroads specifications M-901-A for rubber gears, the new Cardwell Type R-18 rubber draft gear has been granted Certificate of Approval No. 27. It surpassed all the requirements governing capacity, endurance and sturdiness and had a reaction or sill pressure well within the limits of coupler strength.

The R-18 gear was designed for application to the 18½-in. pocket of existing cars of special construction and new ore cars. It is a self-contained factory-assembled unit which is precompressed for easy installation to the car. The gear is symmetrical and no followers are required for the 18½-in. pocket. It is completely interchangeable with friction gears of similar length.

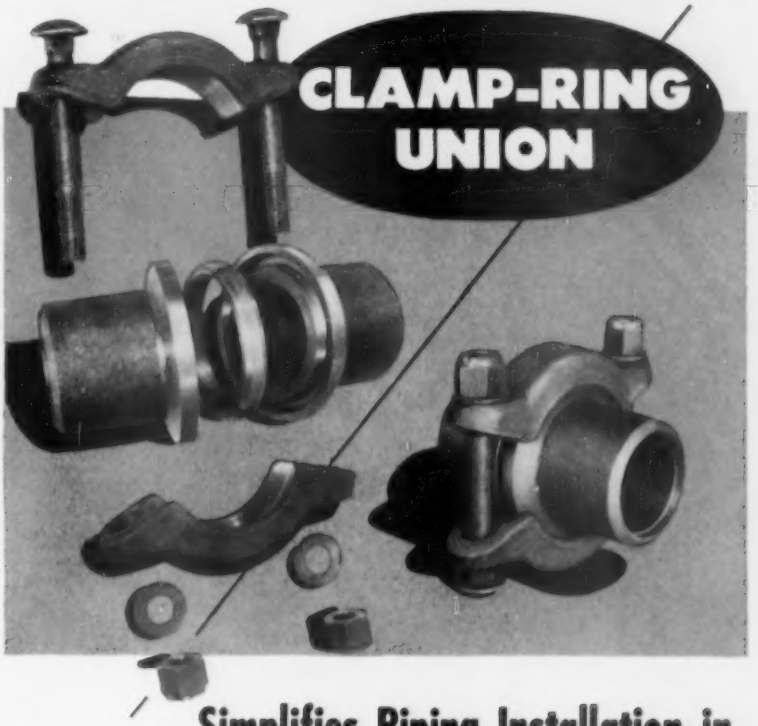
The gear's capacity is obtained in 2¾-in. travel. Of similar construction to the full-size R-20 conditionally approved gear, it further rounds out the Company's line of rubber and of rubber and friction gears. The R-18 is on display at Booths 120 and 121 at the Sherman. *Cardwell-Westinghouse, 332 South Michigan avenue, Chicago 4.*

Vinyl Plastic Tubing

Temflex 105, a vinyl plastic tubing, has been designed to meet the stringent fungus and heat requirements of government specification MIL-I-1631B and is listed as being both self-extinguishing and fungus-proof. Used extensively by electrical equipment manufacturers, the tubing is approved by Underwriters' Laboratories for con-

(Continued on page 98)

WATSON-STILLMAN



Simplifies Piping Installation in Locomotive and Car Heating Steam Lines

Here's the ideal union for locomotive and car heating steam lines. It is readily installed in those hard-to-get-to locations beneath the frame. The clamp can be rotated so that the nuts are in the most convenient position for gripping and turning with a wrench. The union allows the pipe to be pre-fabricated and completely installed in the car frame. When used to join valves with matching ring faces, the W-S Clamp-Ring Union permits easy installation and removal of valves, and allows them to be rotated to any convenient position.

The W-S Clamp Ring Union is presently available in two sizes... for 2" and 2½" IPS pipe. The 2" union has socket-welding ends, whereas the 2½" union is available with butt-welding or screwed ends. Other sizes are available on application.

Sold through Leading Distributors

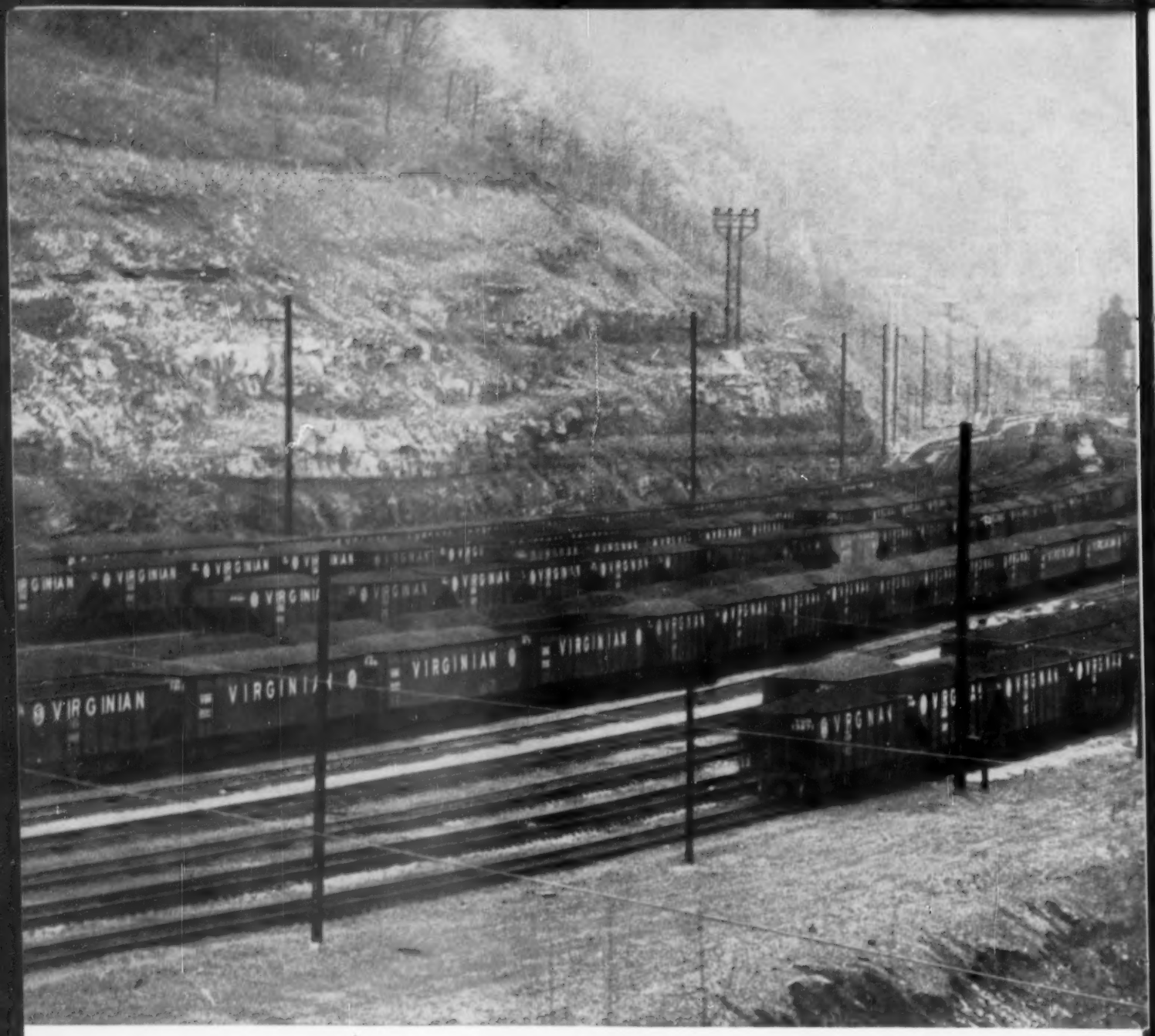
For information on the Clamp-Ring Union and other Watson-Stillman Railroad Pipe Fittings send today for Bulletin RR-1.

WATSON-STILLMAN FITTINGS DIVISION

H. K. PORTER COMPANY, INC.

Roselle, New Jersey

R3



MORE TONNAGE EVERY MONTH...

is moving faster in trains powered by

Fairbanks-Morse Train Masters.

Their power and versatility prove .....

TM

your soundest motive power buy

FAIRBANKS-MORSE

a name worth remembering when you want the best

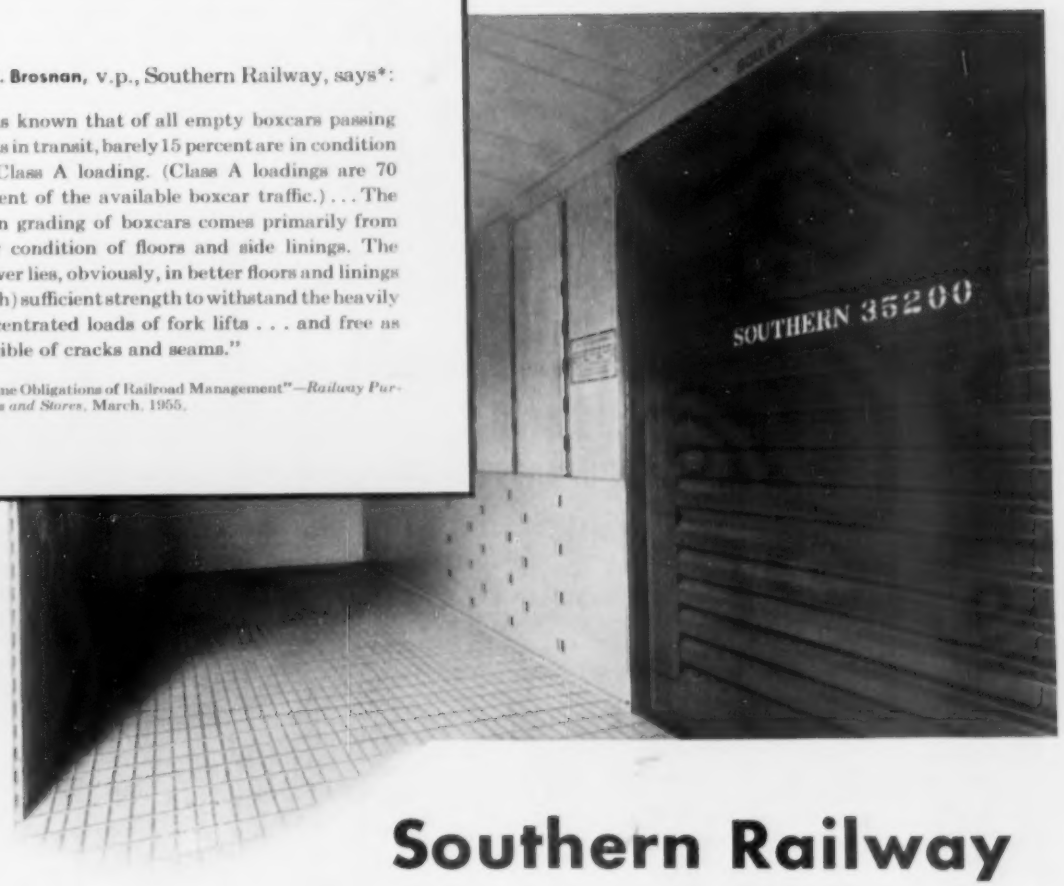
Fairbanks, Morse & Co.,
Chicago 5, Illinois

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • MAGNETOS

D. W. Brosnan, v.p., Southern Railway, says*:

"It is known that of all empty boxcars passing yards in transit, barely 15 percent are in condition for Class A loading. (Class A loadings are 70 percent of the available boxcar traffic.) . . . The down grading of boxcars comes primarily from poor condition of floors and side linings. The answer lies, obviously, in better floors and linings (with) sufficient strength to withstand the heavily concentrated loads of fork lifts . . . and free as possible of cracks and seams."

*"Some Obligations of Railroad Management"—*Railway Purchases and Stores*, March, 1955.



Southern Railway finds the answer with N-S-F

By ordering 1200 boxcars with NAILABLE STEEL FLOORING, this progressive carrier takes an important step to satisfy shippers. The secure steel construction of N-S-F, with the unique nailable steel grooves for blocking, eliminates costly out-of-service time caused by bad-order floors. And Naturally Shippers Favor N-S-F.

NAILABLE STEEL FLOORING is made of low-alloy N-A-X HIGH-TENSILE steel—remarkably strong, corrosion resistant—formed into channels, and welded together to form a unique nailing groove. Nail is clinched in tight grip of steel, yet can be readily removed.

Complete engineering and cost data available from Stran-Steel Corporation, Ecorse, Detroit 29, Michigan. Sales representatives in Chicago, Philadelphia, St. Louis, Atlanta, Omaha, Denver, San Francisco, Montreal, and New York.

STRAN-STEEL CORPORATION

UNIT OF

NATIONAL STEEL CORPORATION

NAILABLE STEEL FLOORING

PAVES THE WAY TO ALL-STEEL FREIGHT CARS

BRUSH MILEAGE
versus
TROUBLE-FREE COMMUTATION

Miles-per-⅛th-inch wear is an important factor in buying Diesel Electric Locomotive Brushes. But it is by no means the most important.

Long brush life is too often achieved at the expense of good commutation. And poor commutation may easily cost far more in terms of extra commutator reconditioning than can possibly be saved on brushes.

After all, diesel brushes average about $12 a set for the average traction motor. Commutator reconditioning costs a minimum of $400.

The moral is pretty obvious.

That's why smooth, burn-free commutation is the first consideration in the design of Stackpole Diesel Electric Brushes.

Performance records on twenty-one Class 1 roads clearly prove their ability to keep commutators in excellent condition over exceptionally long mileage schedules. Still more important, they prove that overall costs are materially lower when the cost of a few extra brush sets is stacked against the freedom from extra commutator repairs obtained through their use.

STACKPOLE
diesel-electric **BRUSHES**
STACKPOLE CARBON COMPANY, *St. Marys, Pa.*

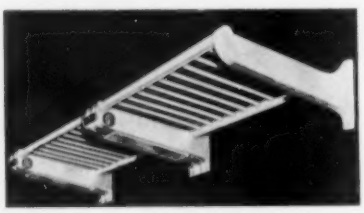
(Continued from page 95)

tinuous operation at 105 deg C. The formulation is said to enhance color stability and reduce shrinkage under conditions of sustained operation at elevated temperatures. *Irvington Division, Minnesota Mining & Manufacturing Co., 6 Argyle Terrace, Irvington 11, N. J.*

Magnetic Plate Clamp

Bux, a magnetic clamp, is said to make unnecessary the expensive labor time and materials previously required in making jigs, dogs, mechanical clamps and similar items as aids in fabrication of metal plates.

The tool, 21 in. in height and approximately 50 lb in weight, generates 3000 lb of power and can be instantly attached or removed from the job. The clamp pulls edges of heavy steel plate flush for butt welding. It contains a one-piece leverage rod and pressure stud mounted on a swivel to enable the operator to perform lap welding easily. A rectifier unit is contained in the post eliminating the need for external converter units. *Buck Manufacturing Company, Los Gatos, Cal.*



Illuminated Seat Numbers For Luggage Racks

Railroad passengers need no longer be confused or delayed in finding their seats due to inability to see the numbers, according to the manufacturer of illuminated

(Continued on page 102)

MOTOR WHEEL
"Center Articulated" Lid Design Gives A *Lifetime* Closure

Motor Wheel Standard and Deep Flange Lids can be removed or installed in a matter of seconds – and without tools. Time tested . . . oil and dust tight . . . full 4-way articulation. The extended housing arm facilitates raising lid, opens a full 120° for easy journal box service.

MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN U. S. A.

NATIONAL RAILWAY SALES REPRESENTATIVE

T-Z RAILWAY EQUIPMENT CO., G. S. Turner, President
8 SOUTH MICHIGAN • CHICAGO 3, ILLINOIS

How the use of NATIONAL Seamless EXTRUDED Stainless Tubing *cuts nut manufacturing costs*

USING NATIONAL Seamless EXTRUDED USS Stainless (type 303) Tubing, the Tri-Clover Division of Ladish Corporation is now turning out hexagonal nuts in less time and at lower cost than they could using solid bar stock. The savings in material cost alone amounts to 11.77 cents per piece.

All machining on the nuts, except threading and O.D. finishing, is done in one operation on a 6-spindle, 3½ inch Conomatic automatic machine. A saving of five seconds in the time cycle was made by using the extruded hexagonal stock versus bar stock. The use of hex tubing has eliminated the cost and upkeep of boring tools—and, because tubing is considerably lighter than bar stock, it can be handled faster and with less difficulty.

NATIONAL EXTRUDED Tubing offers you high strength, uniformity, and dependability that only *seamless* tubing can give. For a better precision part, involving fewer operations and fewer machine hours, investigate NATIONAL Seamless EXTRUDED Tubing—made by the world's largest manufacturer of tubular steel products. Feel free to call our engineers if you'd like help in applying NATIONAL Seamless to your product.

* * *

National Tube employs a hot-extrusion process known as "Sejournet" in which white-hot billets of steel are squeezed into tubing of various shapes by a 2,500-ton hydraulic press and ram—a manufacturing method that insures absolute uniformity of wall strength.

NATIONAL TUBE DIVISION
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

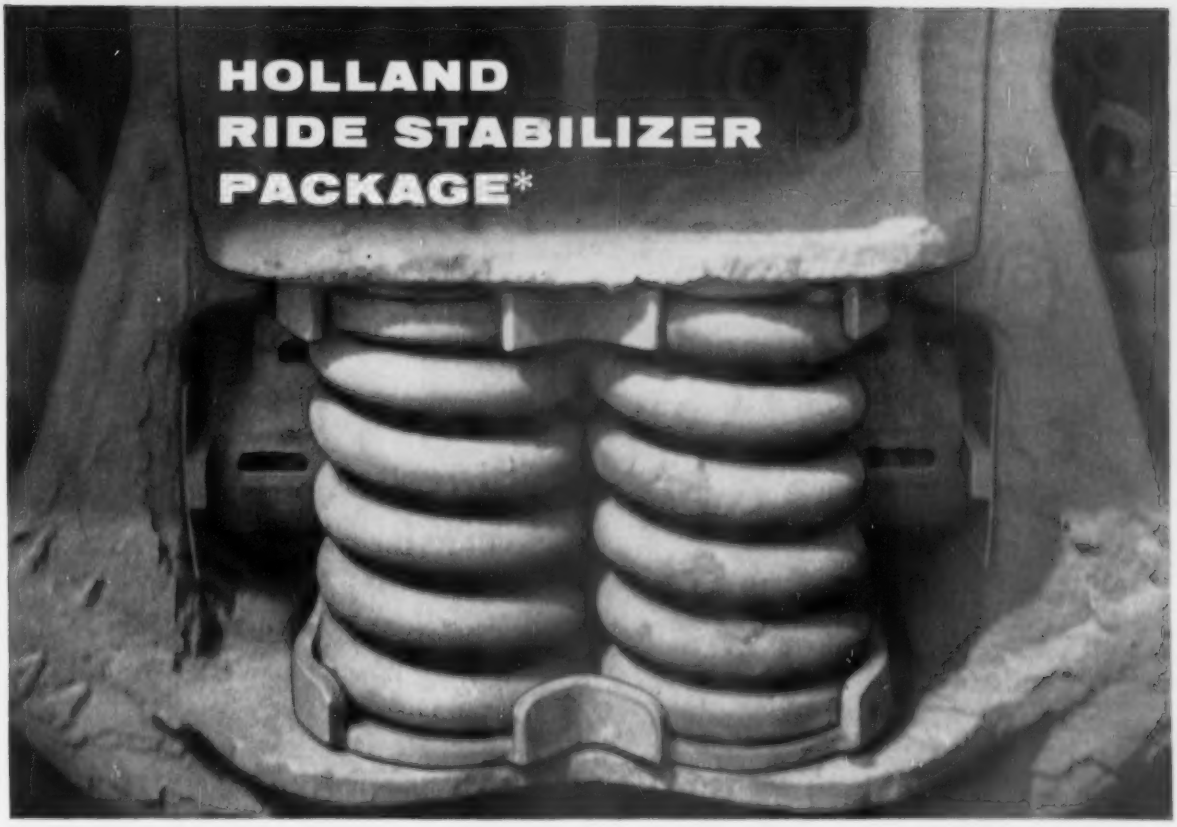
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

NATIONAL Seamless EXTRUDED TUBING

WALLS WITHOUT WELDS

UNITED STATES STEEL

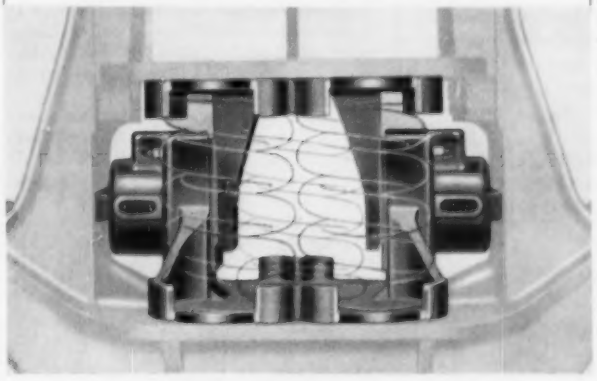


*Pat. Pend.

. . . PASSES MOST RIGID TESTS

No special springs required. Uses standard A.A.R. 2½" Travel, Coil Springs.

No welding, no labor. Simply slip in the complete package.



For several months, the Holland Ride Stabilizer Package has been giving a very good account of itself in actual service, under some of the most severe conditions that a freight car can undergo.

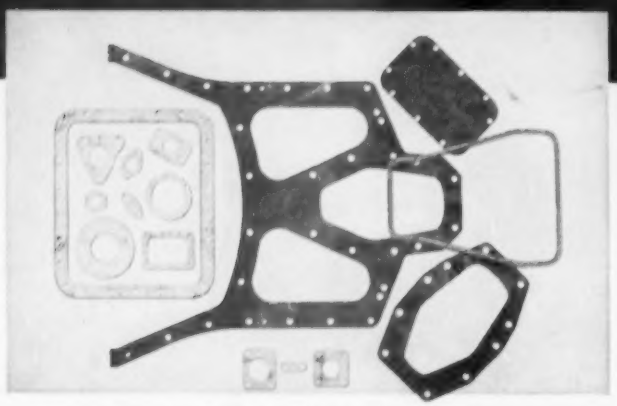
Holland Ride Stabilizer Packages are in daily service in refrigerator cars of a major railroad line. Here, these "packages" encounter salt brine dripping and other extremely corrosive conditions far more severe than are met in the usual freight car operation. Full details of the tests and the "package" will be gladly sent on request.

HOLLAND COMPANY

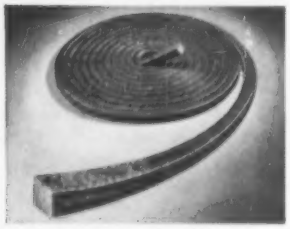
332 s. michigan ave., chicago 4, ill.

68 Years of service to the railroad industry . . .

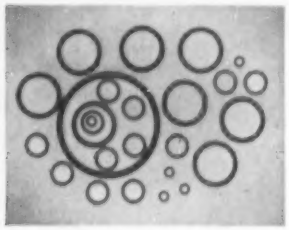
PUT GARLOCK'S VALUABLE PACKING EXPERIENCE TO WORK FOR YOU



Garlock replacement gaskets for diesel locomotives



Garlock LATTICE BRAID* Rod Packing



Garlock Molded Rubber Seal Rings

*Registered Trademark

DIESEL GASKETS, PACKINGS, and MOLDED RUBBER RINGS

Profit by the experience Garlock has gained in serving the packing requirements of most of the Class I Railroads in the United States and Canada. It's yours for the asking.

Your Garlock representative is a specialist who knows the proper replacement part for every diesel locomotive application. He can save you valuable time and help you reduce maintenance and replacement costs.

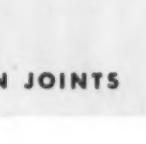
For your convenience, Garlock diesel replacement parts—gaskets, packings, and molded rubber rings—are pre-stocked in handy packages, ready for immediate shipment.

For long, dependable service, specify Garlock diesel replacement parts. Write for complete parts-and-price list.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada, Ltd., Toronto, Ont.

Branch Offices in Most Principal Cities



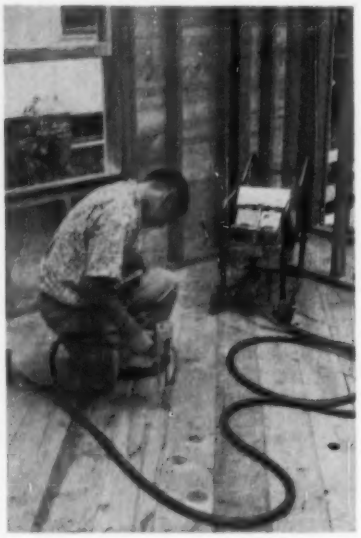
GARLOCK

PACKINGS, GASKETS, OIL SEALS,

MECHANICAL SEALS, RUBBER EXPANSION JOINTS

(Continued from page 98)

seat numbers which have been incorporated in these luggage racks. The plainly visible, easy-to-read numbers are said to pop right out from the racks and can be identified quickly as approached from either end of the car. *Adams & Westlake Co., 1152 N. Michigan, Elkhart, Ind.*



Air Powered Nail Driver

The Nail-A-Matic, an automatically fed nail driver has been developed to help reduce hand nail driving costs. It will find application in industry for mill work, crating, etc. It can be used for nailing 2-penny up to and including 16-penny nails in hard or soft woods, at any angle, straight or clinched at a speed up to 50 nails per minute.

The hammer will not propel the nail from the nose unless it is first depressed in the material. Nails can be driven flush, countersunk or left extended. The feeder is air operated with no complicated timers or valves.

Cam-conversion of the feeder from one nail size to another can be accomplished in a matter of seconds. The unit is mounted on ball-bearing rubber tire wheels and weighs 60 lb. It is equipped with a detachable hopper for dumping nails. *Matrix Engineering Corporation, 3016 East Lake street, Minneapolis.*

Medium-Pressure Welding Blowpipe

The Oxweld W-45, is claimed to offer the greatest welding and heating range ever available in a single hand-welding blowpipe. This medium-pressure oxy-acetylene unit can be supplied with 18 welding head sizes,

(Continued on page 106)

improve operations!

KNOW WHERE THEY ARE... WITH 360° GYRALITES! *Quick!*

This new roof-top PYLE Gyralite tells a big story! Mounted on top of diesel switchers and cabooses it flashes in all directions, spotting their location instantly, day or night, saving countless steps and valuable operating time. This new 360° roof-top Gyralite makes the Pyle line of warning lights the most complete in America for protecting railroad personnel and equipment. Literature upon request.

SINCE 1897

THE PYLE-NATIONAL COMPANY

WHERE QUALITY IS TRADITIONAL

1359 North Kostner Avenue, Chicago 51, Illinois

District Offices and Representatives in Principal Cities of the United States. CANADIAN AGENT: The Holden Co., Ltd., Montreal
Export Department: Railway Supply Co., 30 Church Street, New York

TRAIN LINE CONNECTORS • STAND-BY PLUGS AND CABLE CONNECTORS • TURBO-GENERATORS • FLOODLIGHTS • CONDUIT • FITTINGS • MULTI-VENT

You'll cut handling costs with ROEBLING ALL-PURPOSE SLINGS

You can have these slings with a tapered sleeve attachment with a heavy steel galvanized thimble plus the following attached fittings:

Drop Forged Steel Weldless Hook

Drop Forged Weldless Shackle

Weldless Link

THESE are the easiest-to-handle slings ever put on the market. There are no servings—no bulky sections of rope next to the loop. All wire ends are safely and permanently covered by the tapered sleeve. And on top of that, these slings are remarkably flexible, *doubly* safe, and real time-savers on the big majority of lifting jobs.

Roebling All-Purpose Slings come to you ready for work. They cost less than most other slings and they're a cinch to order. They have the full catalog strength of the "Blue Center" steel wire rope with I.W.R.C. from which they're made, assuring maximum sling service life.

Roebling All-Purpose Slings are stocked in standard sizes and lengths for immediate delivery. Order them from your jobber—and write us for descriptive folder. John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HGTS. BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

BANISH THE BIGGEST CAUSE OF HOT BOXES

Cut-away illustration shows the simplified design of U.S. EVER-PAC and the absence of metal parts. Oil is fed to the journal through the wick pad, which receives its supply by capillary action from integral wicks, pumping action, and from the oil-saturated synthetic sponge rubber pad.

with the new, proven U. S. EVER-PAC*

Here at last is the Journal Lubricator that meets the railroads' chief demand:

Makes "waste-grabs" and other failures of waste packing impossible!

No costly special oil seals required!

Interchanges with present equipment!
(No shop modifications, machining or additional labor costs)

Low-cost initial installation!

Easy determination of oil level!

Low-cost upkeep!

Trouble-free service!

More than one-half of all hot boxes are directly attributable to waste packing, mostly "waste-grabs." Ever-Pac makes "waste-grabs" impossible!

U. S. Ever-Pac has A.A.R. approval for application to a specified number of cars which move in general interchange service (Docket No. L-129).

Years of intensive research and testing show conclusively that with U. S. Ever-Pac, a product of United States Rubber Company, a major cause of hot boxes can now be eliminated.

EVER-PAC GIVES FULL 3-WAY OIL SUPPLY, MILE AFTER MILE. The reservoir on its underside holds 2 pints of oil, and the sponge rubber pad holds 2 pints more – 2 full quarts of oil at all times. Plus 3-way oil delivery:

(1) *Capillary action soaks up oil.* The hungry wick is oil-absorbent. The yieldable sponge rubber, a specially developed synthetic compound, provides a cushioned *upward* contact at all times, providing a controlled rate of *clean* oil distribution.

(2) *Pumping action.* Each vertical or lateral movement of the journal or journal box compresses the pad, thereby setting up a pumping action which pumps oil from the reservoir under the pad through holes to the distributing wick pad.

(3) *Sponge pad flexing.* Each movement of the journal or journal box flexes the *yielding* pad and makes the pad "breathe out" *even more oil* – because the pad retains 2 pints of oil *above and beyond* the amount of oil in the oil reservoir. Free brochure gives full details. Write or get in touch with us at Rockefeller Center, New York 20, N. Y.

***Patented**

Mechanical Goods Division

United States Rubber

metal parts come out clean every time

Switch operating valve before and after cleaning in Magnus Aja-Lif cleaning machine.

Faster Cleaning . . . because vigorous mechanical agitation of the parts in the machine cuts cleaning time to a minimum—no costly hand labor involved.

Precision Cleaning . . . because the cleaning solution "scours" all interior surfaces of intricate parts through turbulent contact created by the parts agitating in the solution.

Economical Cleaning . . . because efficient cleaning saves time and labor costs . . . because the Magnus Aja-Lif can be used with any kind of cleaning solution . . . and because there are few moving parts to wear—no gears or electric motors.

Convenience . . . because the work platform rises to the top of the machine for easier loading and unloading.

At a low initial cost the Aja-Lif is available in sizes to fit any production line. Aja-Lif . . . for traction motor and generator parts, maintenance of way equipment, air brake units, signal equipment, electrical parts and other metal parts that must be cleaned before overhaul and repair.

SEND A COPY OF BULLETIN 704-AL

Name ..... Title .....
Firm Name .....
Street .....
City ..... Zone ..... State .....

magnus

RAILROAD DIVISION

MAGNUS CHEMICAL CO., INC.

77 South Avenue Garwood, N. J.

(Continued from page 102)

8 multiflame heating heads, and 8 extensions.

The aluminum handle is designed to fit either hand, is located for proper balance, and distributes the torch weight over all the fingers of the gripping hand. In addition to the strength and durability of the stainless steel used in making the torch there is its property of retarding heat conduction which keeps the torch cool. The hose connections are offset to reduce the pull of the hoses at the rear of the blowpipe.

A locking device utilizing a circular spring in the head coupling nut permits quick change of welding heads without a wrench and yet allows the heads to be swiveled without releasing them or extinguishing the flame. Heads range from 2 to 300 cu-ft per hr capacity. *Linde Air Products Company, Division of Union Carbide & Carbon Corp., 60 East 42nd street, New York.*

Lighting Fixture

These Localite fixtures are for machine tool, assembly and inspection operations. Improved articulation makes possible directing the light reflector in a thousand positions, according to the manufacturer. Universal arm joints with large frictional disc bearing surfaces provide a 135-deg angle bend. Collar disc joints rotate 180 deg. Various style reflectors include heavy duty industrial type sockets. Wiring is SPT-2 18/2 heavy duty plastic rip cord. *Fostoria Pressed Steel Corporation, Fostoria, Ohio.*

Guillotine Type Cable Cutters

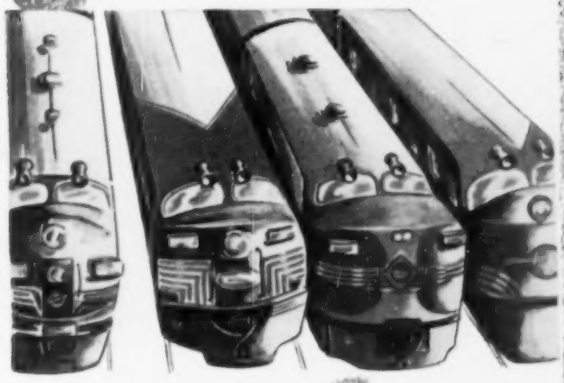
This series of cutters, available in three models, can be used to cut bundles of cables containing various combinations of structural, electrical, and hydraulic lines. Similar in overall arrangement, the three types vary primarily in the diameter of the cables they are able to cut.

Model 209 for 9/16 in. diameter cable, is powered by electrical primer only. It is provided with shear-type safety pins which prevent blade movement before firing. It has expendable parts and can be supplied with reload kits.

Model 247 for 1⅛ in. maximum diameter cable, is electrically fired and the case-hardened steel knife is powered from a .38 calibre propellant cartridge. The unit

(Continued on page 117)

Right from the word go!



. . . There is a reason why most manufacturers of Diesels and rolling stock specify AMPLI-BOND for electrical connections in wire sizes from #8 to 4/0. It's because AMPLI-BOND Terminals and Connectors are designed to fill the specialized requirements for railway use. They are rugged enough to stand up under constant use and pre-insulated to eliminate wrapping, tape or spaghetti. The rough vinyl insulation is bonded to the terminal barrel; won't slip off or crack under crimping pressure. Hand Hydraulic and DYNA-CRIMP tools have positive crimping action to make fast, high tensile strength crimps.

Ampli-Bond

Terminals and Connectors and crimping tools for wire sizes #8 to 4/0.

AMP

AIRCRAFT-MARINE PRODUCTS, INC.

2100 Paxton St., Harrisburg, Pa.

In Canada:
Aircraft-Marine Products of Canada, Ltd.
1764 Avenue Road
Toronto 12, Ontario, Canada
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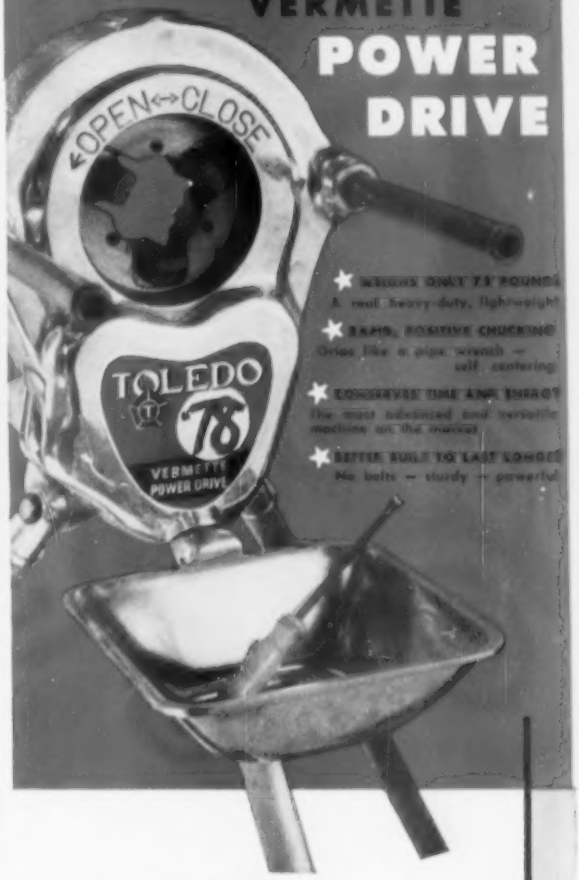
It's Amazing!

THE TOLEDO NO. 78 VERMETTE POWER DRIVE



★ WEIGHS ONLY 73 POUNDS
A real heavy-duty, lightweight

★ RAPID, POSITIVE CHUCKING
Grips like a pipe wrench — self centering

★ CONSERVES TIME AND ENERGY
The most advanced and versatile machine on the market

★ BETTER BUILT TO LAST LONGER
No belts — sturdy — powerful

A time proved, PORTABLE power drive providing effortless cutting, threading and reaming of pipe and conduit . . . a worthy addition to "TOLEDO's" well known line of quality pipe tools. Fully guaranteed. Handles up to 2" sizes . . . grips, tightens and centers pipe automatically, forward or reverse. It's the lightest portable power drive of its kind. And remember . . . if it bears the "TOLEDO" label . . . you know it's a dependable product.

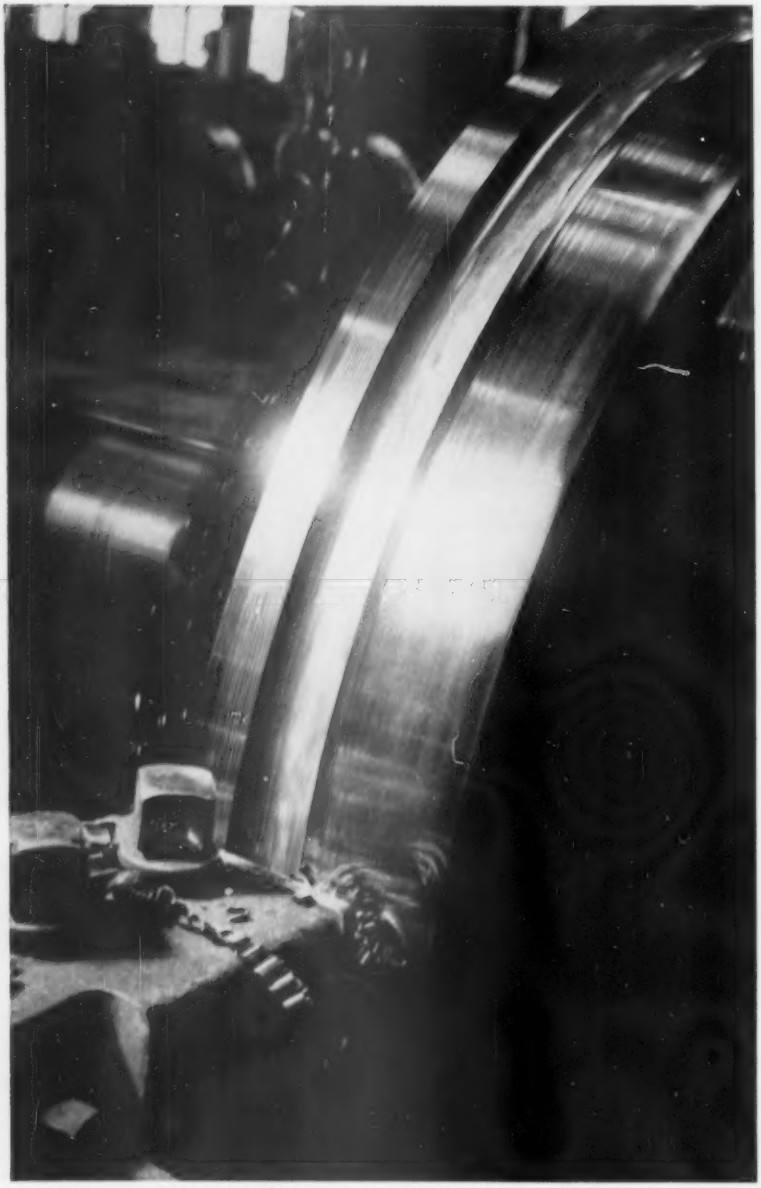
Write today for new free bulletin with conclusive proof of superiority. Your "TOLEDO" supplier has all the facts.

TOLEDO PIPE THREADING MACHINE COMPANY
TOLEDO 4, OHIO

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO®

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES



ILLINOIS CENTRAL RAILROAD. Close-up of the tracer actuated profiling tool cutting new contour on a wheel on the NILES 52" car wheel lathe in the IC's Burnside Shops (Chicago). Note the depth of cut, 24 tapes.

NILES LATHE

In these outstanding wheel shops, Niles 52" hydraulic car wheel lathe can turn set in less than 20 minutes

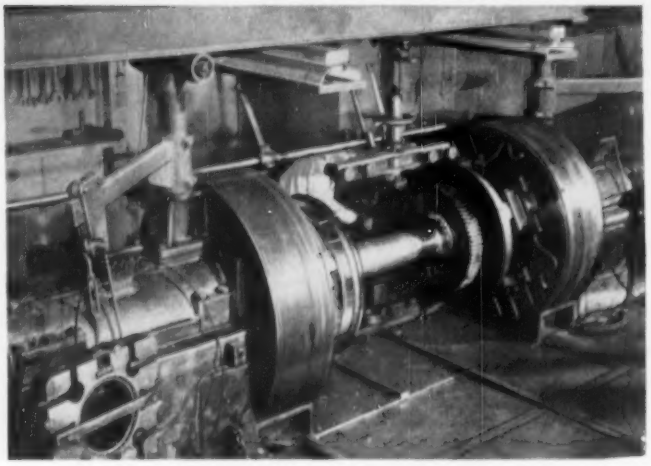
"From floor-to-floor in less than twenty minutes, compared with old, slow lathe's hour and 20 minutes!" is a typical report from these users of the Niles 52" hydraulic car wheel lathe with profiling attachment.

Designed for heaviest duty with a wide range of spindle speeds up to 25 rpm, this lathe can be used with either tungsten carbide or high speed steel tools.

Extra Wheel Mileage

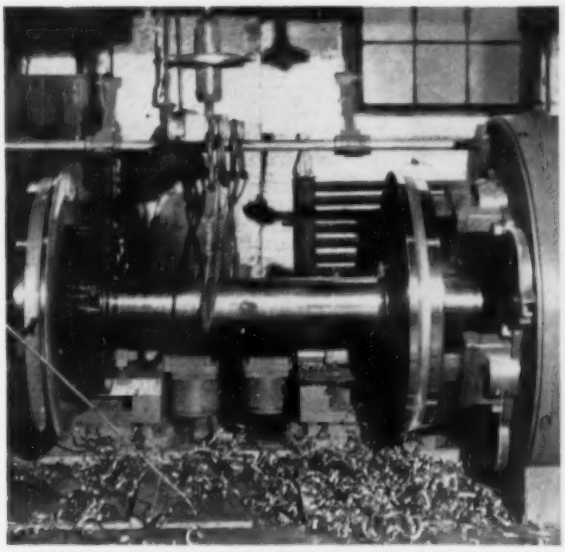
By switching to cutting with carbides, these shops are also getting thousands of extra miles of wear from many wheel sets. That is due to the carbide tool's slicing right through spots of excessive hardness, while the high speed steel tool must cut below the spot into softer metal, taking off more surface than required by the depth of the concavity.

If your wheel shops are still re-turning wheels the slow, old-fashioned way, consider carefully how much a modern Niles wheel lathe will save you in manhours, wheel inventory and replacement of wheels.

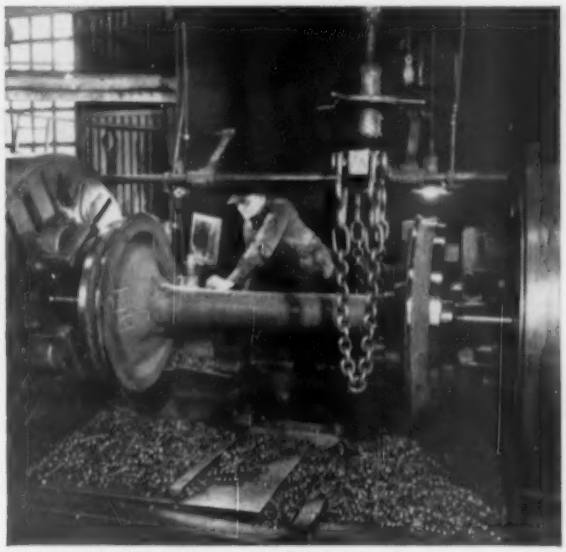


UNION PACIFIC RAILROAD. When this Niles Wheel lathe tungsten-carbide tipped tools and profiling attachment was installed in the UP's Los Angeles Shop, wheel re-turning time was cut to about 20 minutes.

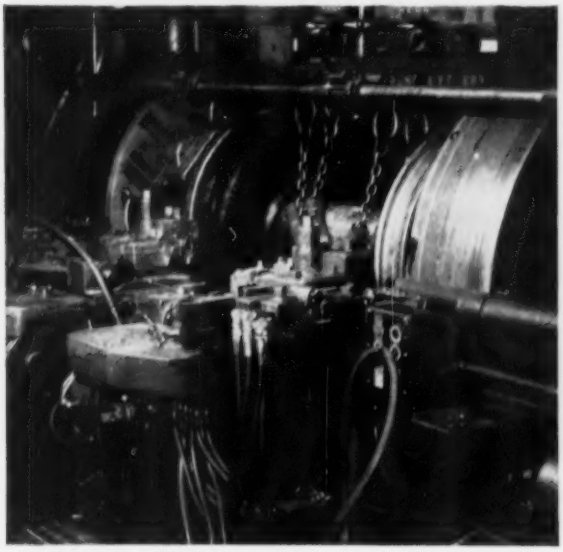
RE-TURNS WHEELS UP TO 300% FASTER



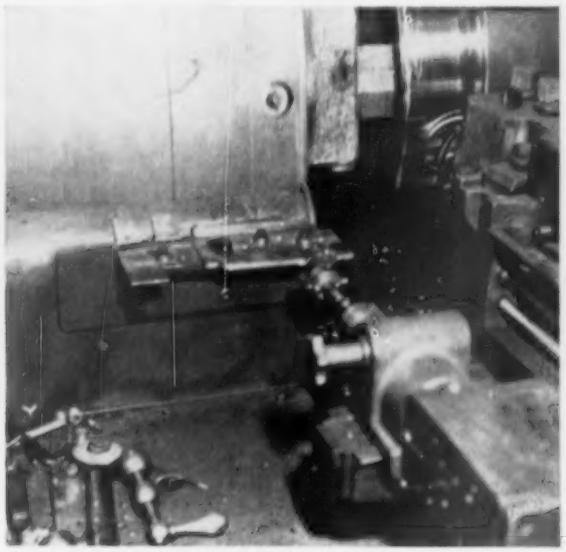
MISSOURI PACIFIC RAILROAD. Wheel set in NILES 52" car wheel lathe being profiled. (In Missouri Pacific's North Little Rock Shop.)



THE PENNSYLVANIA RAILROAD. Above photo was taken from the rear of the NILES 52" car wheel lathe in the PRR's Altoona Shops. Flanging and profiling tools are at work.



SOUTHERN RAILWAY. Profiling and flanging tools at work on both wheels of a set on the NILES 52" car wheel lathe at the Southern's Chattanooga Shops.



NORFOLK & WESTERN RAILWAY. Close-up view of the cutting of new profile with the NILES 52" hydraulic car wheel lathe in the N&W's Roanoke Shops. Note tracer tip "climbing" the crest of the profile template.

Write: To find how you can cut *your* wheel shop costs with the Niles 52" hydraulic car wheel lathe and other outstanding Niles machine tools, write now to Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.

BALDWIN-LIMA-HAMILTON

Hamilton Division • Hamilton, Ohio

NATIONAL CARBON COMPANY has always recognized the specialized nature of diesel-electric locomotive service. No other set of operating conditions in rotating equipment duplicates those of diesel-electric traction motors, generators and auxiliaries. That's why National Carbon was first with large-scale research and development work on brushes *specifically* formulated for railroad services.

The railroads' interest in—and close cooperation with—this development program have paid handsome dividends—in ever-increasing miles per dollar spent for brushes and for commutator and other maintenance, as well as virtual elimination of mechanical brush failures.

No wonder far more "National" brushes are used in diesel-electric locomotive application than all other brands combined! Prove to yourself that you go *farther* with "National" brushes — for *less*.

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

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A Division of Union Carbide and Carbon Corporation
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Have 3 times longer cord life!

TESTS PROVE IT!

Here are some of the startling facts:

26% greater *oil* resistance
33% greater *heat* resistance
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50% greater resistance to *cutting*
58% greater *abrasion* resistance
118% greater resistance to *tearing*
197% greater *impact* strength
488% greater *flexibility*

Than the average of molded cords of other makes

Your United States Rubber Company sales engineer will call on you to prove CONCLUSIVELY that U. S. Laytex Royal Master is the finest portable cord ever made. Don't place any order for portable cords until you get the full facts about U.S. Laytex Royal Master. Get in touch with us at the address below, if one of our sales engineers hasn't already visited you.

US RUBBER

UNITED STATES RUBBER COMPANY
Electrical Wire and Cable Department
Rockefeller Center, New York 20, N. Y.

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Sealtite railroad fasteners

The nation's great railroads use Lewis Sealtite fasteners. Accurately engineered, designed to do a better job, Sealtite products are tough, durable, made of finest grade metals for heavy duty. They meet the most exacting specifications.

More than 20 years of manufacturing experience have established Sealtite's top quality in the industry. Such famous Sealtite features as the patented fins, for better seating, Sealtite's accurate threading, for easy installation, and many others, have given Lewis Sealtite products a "Class I" reputation in the field.

The next time you specify fasteners, specify Lewis Sealtite, a complete line of first grade fasteners for America's leading railroads.

All Sealtite products are available in HOT-DIP GALVANIZED, SEALED-IN-ZINC finish, which stops rust and corrosion. Tests prove that the molten zinc bath gives Double-Life, greater economy through fewer replacements.

Serving 85% of America's Class 1 Railroads

*One of many leading railroads using Lewis Sealtite products

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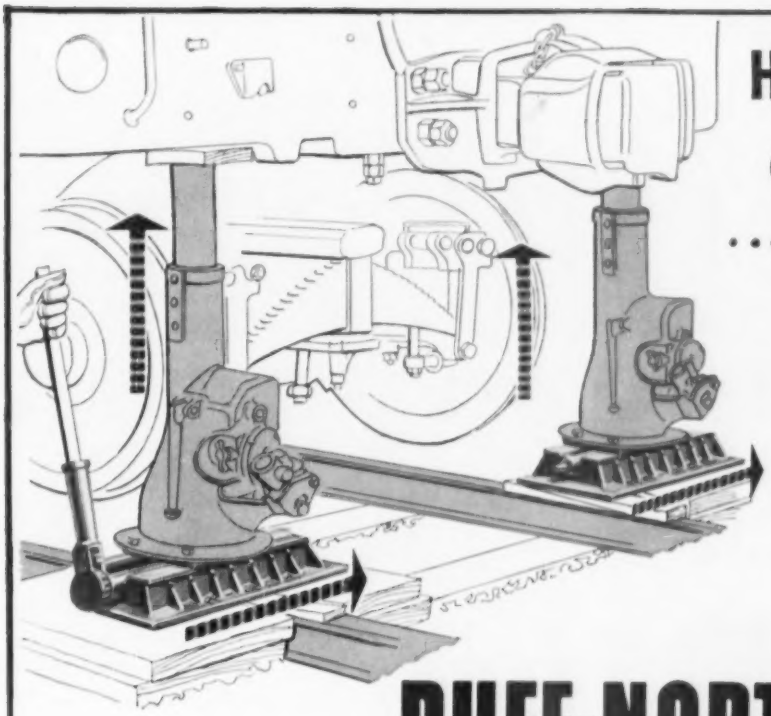
Sealtite Bolts available with Loktite Nut #2, washer nut, or std. sq. and hex. nuts.



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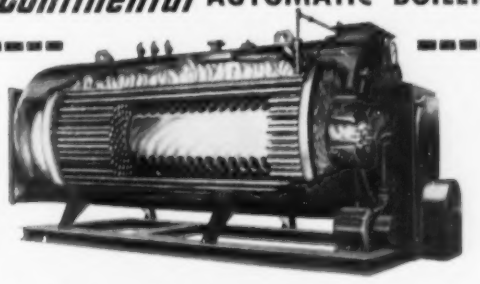
No need to call for a crane when you have a pair of Duff-Norton **Traversing Bases** and **Jacks** handy. These bases enable crews to lift and move wheels horizontally until they are in alignment with rails, then to lower locomotive or car on rails. Ratchet socket mechanism can be applied to either end of shaft. For complete information write the world's oldest and largest manufacturer of lifting jacks—ask for bulletin AD4-G, Duff-Norton Company, P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON *Jacks*

"Giving Industry a Lift Since 1883"

Why it COSTS LESS to Buy and Keep a *Continental* AUTOMATIC BOILER



Continental Boilers are frequently *lowest* in purchase cost, and Continental Radiant Flame Heating meets or beats other methods of combustion for fast, economical heat. Being baffleless, Continental Boilers are lighter—thus are less costly to ship, easier to install. Many maintenance "sore spots" are eliminated because of uniform longitudinal expansion and absence of baffles. Hinged front and rear doors cut shutdown time to a minimum.

Sizes 20 to 500 hp; 15 to 250 psi. Gas, oil or combination fired. Write for Bulletin.

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Do you have an item you want manufactured and sold for you *on royalty or license basis*

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The manufacturer of the Sweeney POWERENCH and other railroad maintenance tools is interested in the production and marketing of additional items.

If you feel you have a good thing which is needed in the railroad industry, or any other field, write to us at the address below.

We are well equipped, both from a manufacturing and sales standpoint, to do an outstanding job with a needed product. An arrangement might be made that would be mutually beneficial.

Write to:

B. K. SWEENEY MFG. CO.

1601 23rd St. Denver 17, Colorado

Mr. J. E. McLeod, Chief Mechanical Officer, The Chesapeake and Ohio Railway Company reports, "We have developed a practical and economical method for inspection of freight car journals in service under rolling equipment through the active sponsorship of Mr. C. A. Taylor, Vice President, Operations." Mr. McLeod continues, "The Sperry Ultrasonic Reflectoscope has become a major factor in our program for preventing costly and dangerous accidents resulting from defective car axles."

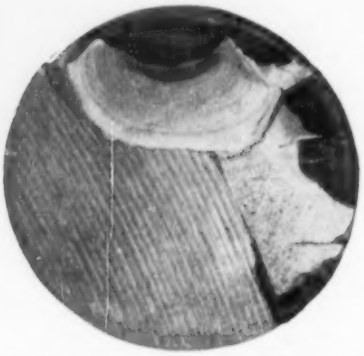
C AND O FOR PROGRESS

promotes safety and prevents costly damage with MOBILE ULTRASONIC EQUIPMENT

A specially designed "railroad journal test car" transports the Reflectoscope and puts the operator within close reach of freight car journal boxes for inspection. This highly efficient method of testing supplements, and could in fact supersede, the old costly method of removing the axle from the car before conducting the check.

The operator drives easily and rapidly from one journal box to another placing the Ultrasonic searching unit on the ends of the journals. Reflectoscope indications are displayed on a cathode ray tube mounted directly in front of the operator.

"Early detection and removal of faulty axles like this can save a railroad hundreds of thousands of dollars," says Mr. McLeod. "This is good evidence as to the effectiveness of the Sperry Ultrasonic Reflectoscope."



Continuous research in Ultrasonic Testing has developed techniques for inspecting numerous vital railroad components. For example, Sperry can provide you with fast, economic locomotive axle and wheel testing methods. Contact your nearest Sperry office for detailed information on these and other tests. We'll be glad to give you working demonstrations in your shops.

Sperry

FIRST IN RAIL TESTING

SPERRY RAIL SERVICE

Division of Sperry Products, Inc.
Danbury, Conn.
New York Chicago St. Louis

These New Cars, fabricated largely of nickel alloy steels, accelerate at twice the rate of the old, and provide 50% greater deceleration. Controls and safety devices are powered by a 24-cell Edison "B4H" nickel-iron-alkaline storage battery. ACF Industries, Inc., New York 8, N. Y., built this modern type car for New York City Transit Authority.

4,766,019 passengers daily

...so New York City Transit Authority turns to Nickel Alloys

TAKING CARE of such a tremendous traffic load, naturally, puts a strain on equipment. Each car must be built for maximum safety, and for annual wear and tear from hundreds of thousands of passengers, and innumerable starts and stops.

New York City Transit Authority's answer is a new type of car that makes wide use of nickel alloys. Alloys that cut maintenance. And power costs, too, in a car that's lighter and brighter than the city has ever before seen.

The builder, ACF Industries, Inc., used truck frames and bolsters of 2½% nickel steel. High strength, low alloy steels containing nickel are utilized for car and underframing. During years of use, this type of wrought nickel steel keeps much of its original strength. Because it's five times as corrosion-resistant as carbon steel.

Each car also uses some 2500 pounds of rigidized stainless steel, Type 302. In underseat paneling and beneath windows, this chromium-nickel alloy adds strength, cuts weight, resists scuffling, and needs no paint. Seat frames, backing, hand poles and hand straps are likewise, Type 302, a labor-saving chromium-nickel stainless steel.

Alloys containing nickel cut bulk and dead-weight, minimize wear and corrosion, add beauty and safety. So let us help you with our wide experience. Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.

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"A simple operation and Punch-Lok puts your shop hose in use again —also great for diesel engine overhaul jobs," say Doc Punch and Mr. Lok.

Built To Last 6 Years

Proved in daily use! Miller Journal Box Lubricators solve hot box problems, reduce maintenance costs, pay for themselves in time saved alone. Here are the reasons why:

1. 60% wool; 40% cotton threads are needled through strong wicking cloth and rubberized on the underside with oil-resistant synthetic latex. Threads cannot displace even during severe impact switching, because they are anchored in place. Latex coating on underside keeps threads saturated with oil even after long layovers.

2. Heavy cotton wicking cloth provides capillary feed of oil to journal. Also provides mechanical strength, maintaining the lubricator's shape.

3. Brass buckles aid in removing lubricator from journal box for reclaiming or replacement. Simple non-mechanical design keeps journal box maintenance to a minimum; requires no special installation or servicing techniques.

4. Resilient cellular core sections are made of oil-resistant synthetic rubber. They maintain a constant pressure against the journal for positive, even lubrication. Double cotton duck harness retains core sections in blanket.

MILLER Journal Box Lubricators

AAR approved for 10,000 car sets in interchanged service and limited approval for 36 month repack.

Call or write for complete information on how the Miller Journal Box Lubricator can reduce your hot box problem. If you prefer, a sales engineer will call on you in person.

MILLER LUBRICATOR COMPANY

Telephone 2381 Winona, Minnesota

(Continued from page 106)

is suitable for reuse through approximately 25 operations. Reload kits containing necessary expendable parts are available.

Model 174 for 2¼ by 1½ in. maximum opening, is available for either remote electrical firing or primacord actuation from a detonator-safe initiator. Other sizes of cables or lines and various specific requirements can be accommodated by modifications of these cutters. *Beckman & Whitley, Inc., 918 E. San Carlos avenue, San Carlos, Cal.*

Fault Detecting Electronic Instrument

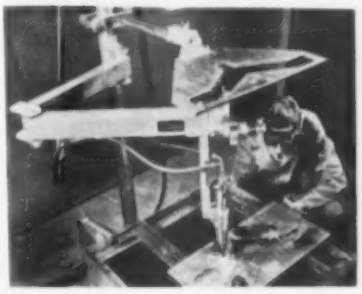
The Auditec is a portable instrument for detecting faults and bearing failures in motors, and machinery, leaks in pipelines and surface flaws in many materials. With it, the operator can hear sounds of impending trouble and quickly trace them to the exact source.

The unit consists of a sensitive contact-microphone encased in a probe handle, a three stage amplifier and plug-in headphones. Visual measurement can be made by adding an output meter to the outfit. It is powered by standard batteries. *John Ould, (U.S.A.) Ltd., 519 South Fifth avenue, Mount Vernon, N. Y.*

Plastic Steel

Devcon, consisting of 80 per cent steel and 20 per cent plastic, can be used for making tools, drill jigs, machine fixtures, chuck jaws, nests and other items. Two hours after the addition of a hardening agent, the mixture of steel and plastic becomes a rigid, steel-like mass. No heat or pressure is required. Once hard, it can be sawed, threaded, drilled or ground on metal-working equipment.

Devcon A is a putty and can be applied to a vertical surface and will not run or sag. Glass fabric and tailoring are not required. Devcon B is a viscous liquid that can be poured. There is practically no shrinkage during hardening, and, once set, they are durable and permanent. *Chemical Development Corporation, 200 Endicott street, Danvers, Mass.*



Flame-Cutting Machine

The No. 42 Camograph, featuring a permanent magnetic roller, cuts any shape up to a full 42 in. circle and straight lines to 92 in. It is said to be an ideal tool for repetitive, accurate shape cutting with a single torch. The flame cutter also serves as an auxiliary unit to supplement output of larger shape-cutting machines.

The permanently magnetized tracing roller accurately follows a metal template of the most intricate shape. Its motor drive shaft is equipped with a simple worm-gear drive, there being no couplings, pulleys or belts. The device is portable and will shape-cut to any practicable thickness. *Air Reduction Sales Company, Division of Air Reduction Co., 60 East 42 street, New York 17.*

Ratchet Lever Hoists

Two coil chain ratchet lever hoists, models L-1½ with a capacity of 1½ tons and LD-3 having a capacity of 3 tons have been made available. They are fitted with levers instead of gears. These hoists with 85 per cent efficiency, take only 60½ lb of handle pull to lift a 1½ ton load and 74 lb to lift 5 tons.

The devices are made either in malleable iron or aluminum alloy. Model L-1½ in malleable weighs 26½ lb and 20 lb in aluminum. Model LD-3 is 34½ lb in malleable iron and 28 lb in aluminum. The hoists are tested for 100 per cent above capacity.

Hooks for the units are made of drop-forged alloy and will not bend according to the manufacturer. The housing can withstand heavy impact loads and will withstand rust. The flexible coils can wrap in any direction and will not kink or fray. A free-chain lever allows the chain to be pulled through the hoist head for adjustment when not under load. *Coffing Hoist Division, Duff-Norton Company, Danville, Ill.*

Pipe Threader Power Drive

The No. 78 Vermette power drive features heavy-duty construction with compactness and light weight. It can be used for cutting, reaming, threading and fitting operations. The chuck, which can be set up in a few seconds, handles ¼- to 2-in. pipe and conduit.

The device utilizes a complete gear train with hardened alloy steel gears mounted on ball bearings. It has a variable speed 115-volt, reversible, air cooled a-c or d-c motor with ball-bearing mountings. *Toledo Pipe Threading Machine Company, 1445 Summit street, Toledo 4, Ohio.*

Proved by USE!
Works in seconds!
Loosens Rusted Bolts
nuts, screws, "frozen" parts
. . . . without breakage!
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Liquid WRENCH
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A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.
Makes joints LEAKPROOF!
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GASKET & JOINT SEALING COMPOUND
Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.
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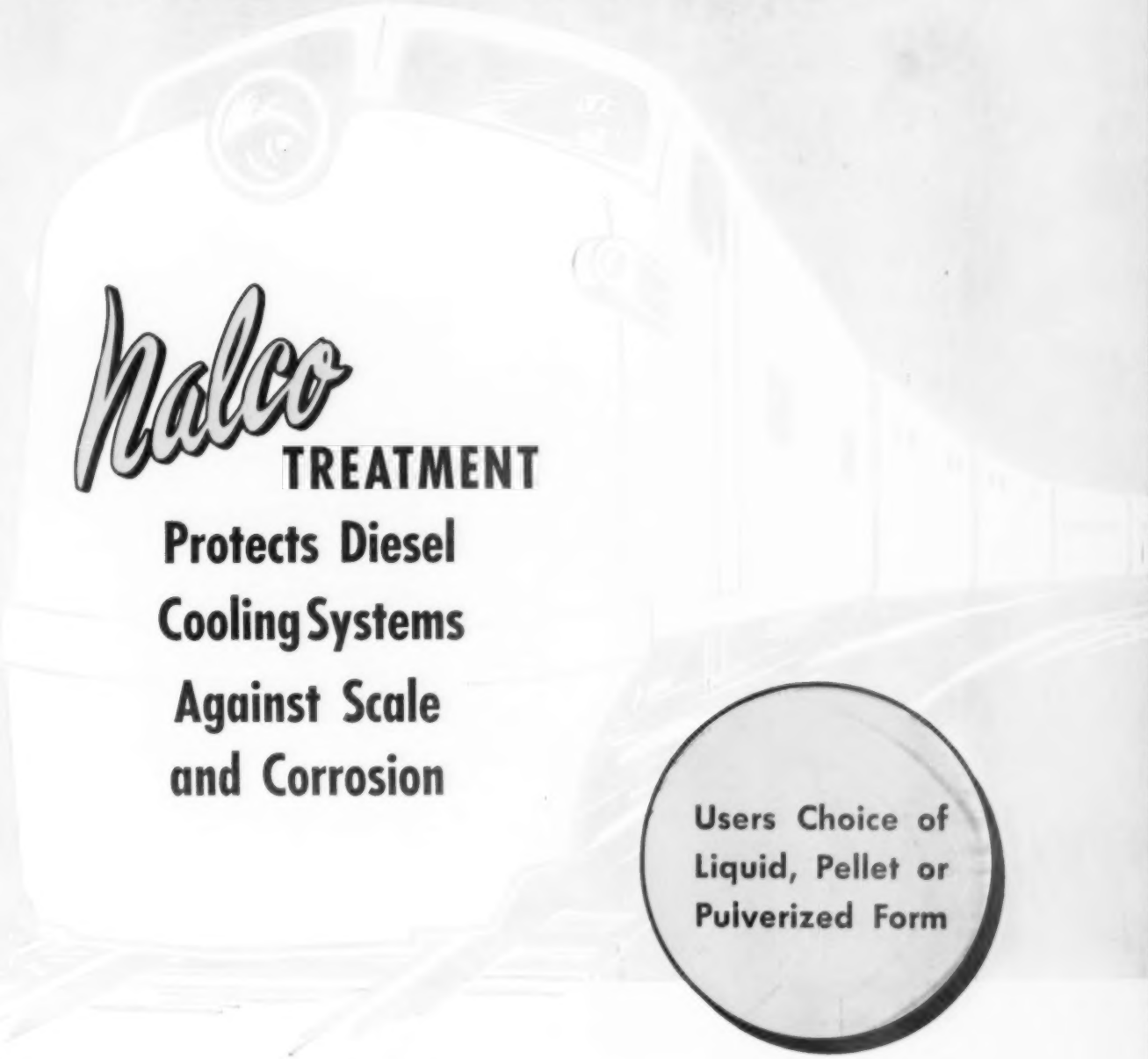

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Users Choice of Liquid, Pellet or Pulverized Form

Important to your diesel engine availability! Cooling systems can't help but scale and corrode without adequate chemical protection.

Nalco has the effective and economical treatment you want . . . whether you prefer liquid, pellet, or pulverized form. Chromate as well as non-chromate type treatments are available.

Use these proved *Nalco* non-foaming treatments with complete safety . . . they provide outstanding metal protection without damage to any of the non-metallic parts—like gaskets or hose—in the cooling system.

Complete details sent promptly upon request. Call your *Nalco* Representative, or write direct.

NATIONAL ALUMINATE CORPORATION

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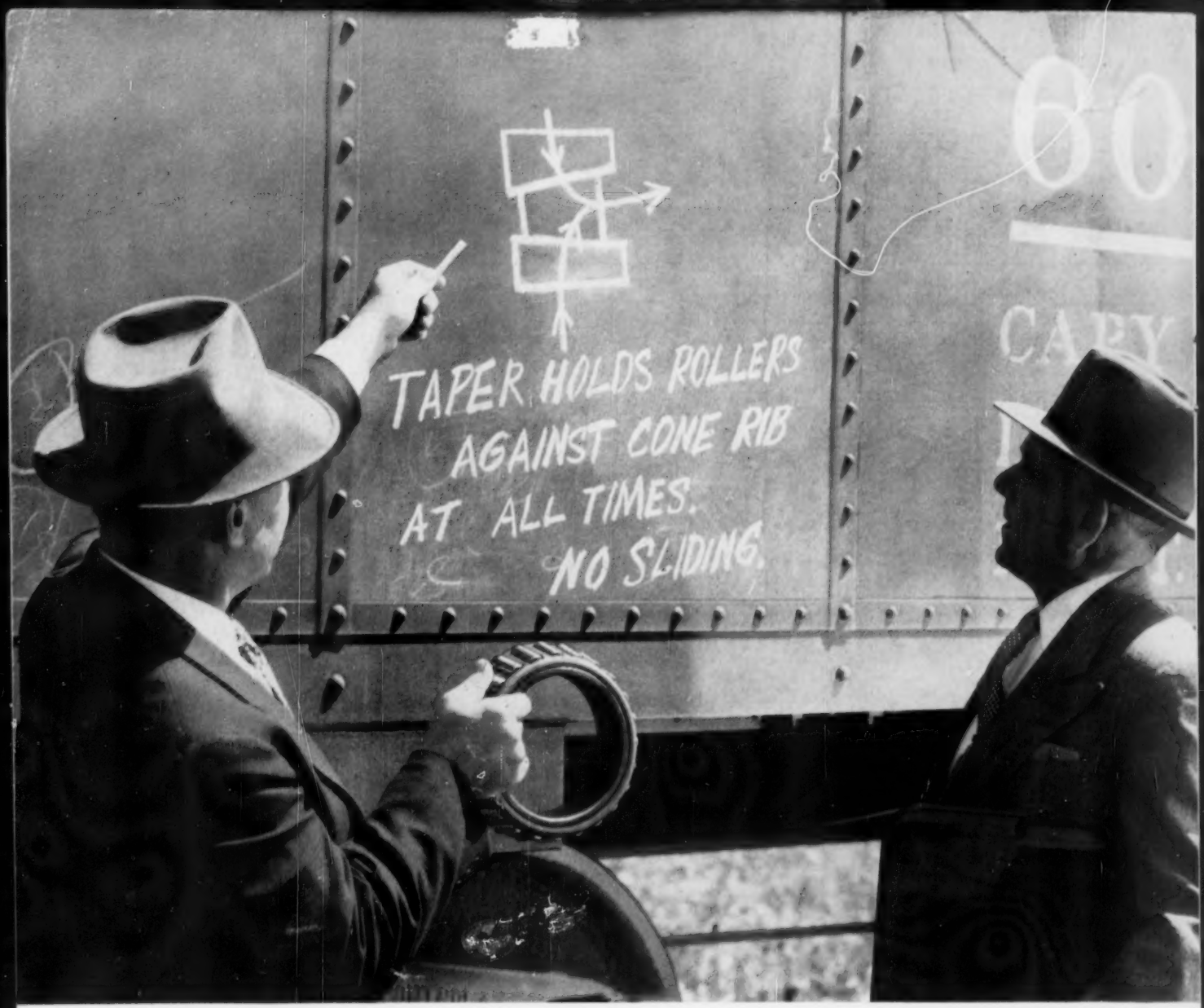
PRODUCTS . . . Serving the Railroads through Practical Applied Science



The taper makes Timken® the only journal bearing that delivers what you expect when you buy a roller bearing

RAILROADS put freight car journals on roller bearings for two important reasons: first, to end the hot box problem, and second, to cut operating and maintenance costs to a minimum. The Timken® tapered roller bearing is the *one* bearing you can count on to do these two things. Here's why:

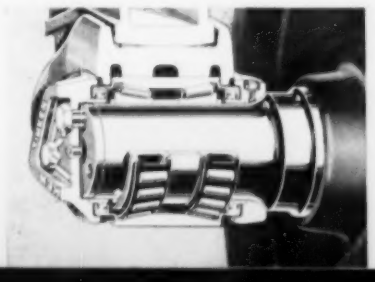
1) *No lateral movement within the bearing.* The taper on Timken bearings prevents lateral movement. There's no pumping action to force lubricant through the seals and out of the journal box, no scuffing of rollers and races to shorten bearing life.

2) *Positive roller alignment.* The taper holds ends of rollers snug against the rib, where wide area contact keeps them properly aligned. Rollers can't skew to upset full line contact.

The taper makes Timken the only journal bearing that ends the hot box problem and pays for itself over and over and over again by cutting operating and maintenance costs to the bone. For instance, terminal bearing inspection time is slashed 90%, lubricant cost is reduced as much as 89%. The new Timken heavy-duty AP (all-purpose) journal bearing assembly can go three years without adding lubricant.

To further insure Timken bearing quality, we make our own steel. We're the only American bearing manufacturer that takes this extra step to insure quality. And we make our bearing steel nickel-rich for added toughness. So be sure you *get* what you pay for when you switch to roller bearings to end the hot box problem and cut operating and maintenance costs to a minimum. Get Timken *tapered* roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱
BEARING TAKES RADIAL ↓ AND THRUST ←|→ LOADS OR ANY COMBINATION ↓←



THE TAPER MAKES

TIMKEN

THE BEARING YOU TRUST